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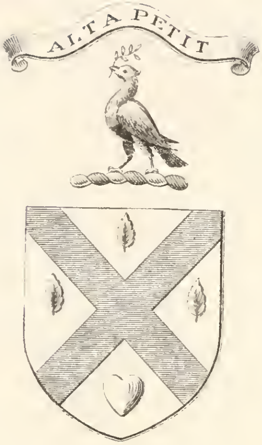

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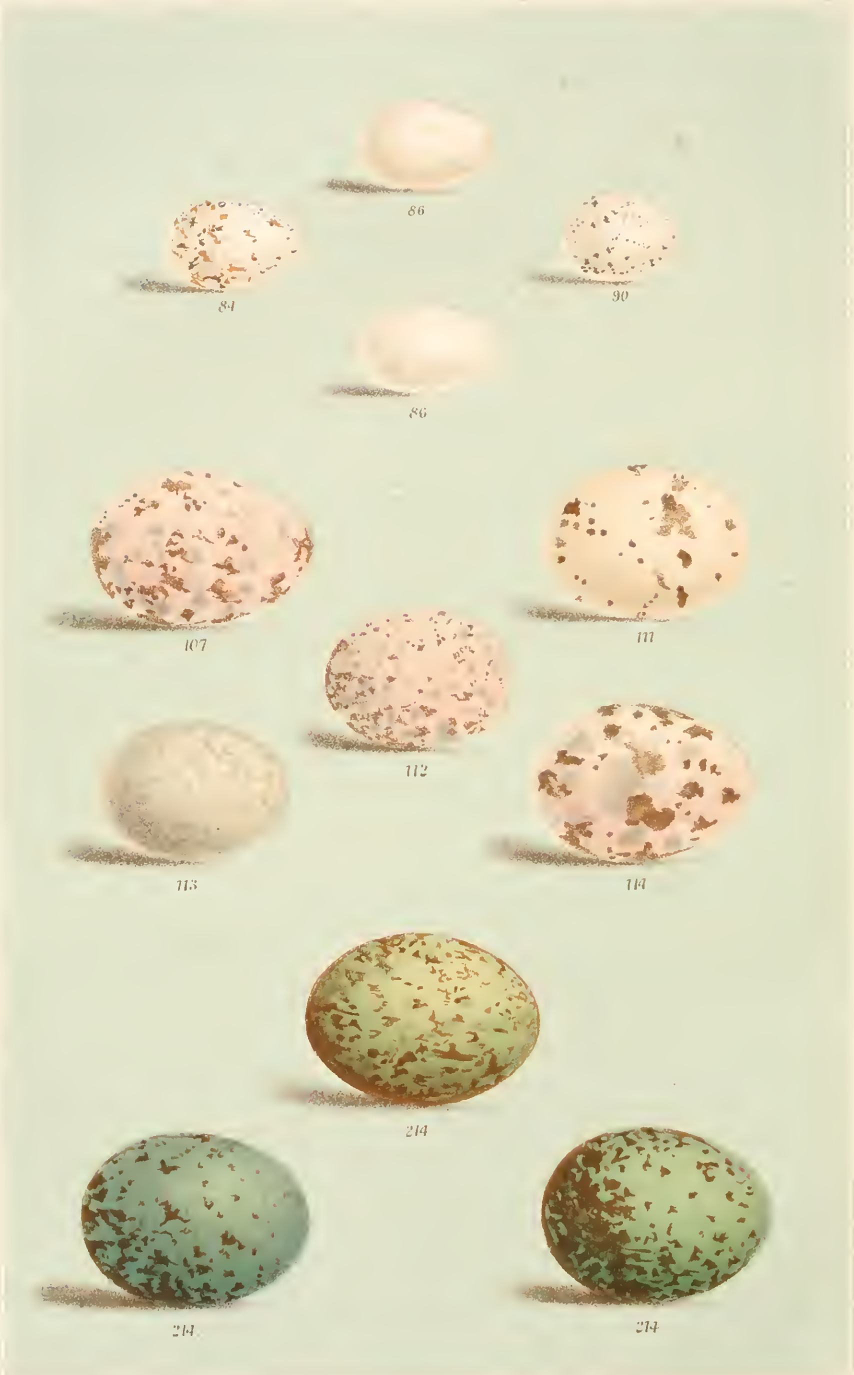
Symons, J. L.	Bombay
Symons, H. S.	Bombay

NAME.	RESIDENCE.
Symons, N. S.	Bombay
Scarborough, Earl of	Yorkshire, England
Scott, M. H. (C.S.)	Dhulia
Searle, W. H. W.	Poona
Shopland, Capt. E. R.	Bombay
Sinclair, Dr.	Kolhapur
Smyth, R. Bateman (C.E.)	Madras
Spence, L. H.	Kaira
Summers, Thos.	*Europe*
Shrimant Hanmantrao Gopalrao	Kolhapur
Servai, Cursetji N.	Bombay
Stewart, R. B. (C.S.)	Dharwar
Spencer, F. A.	Bombay
Tata, Dorab, J.	Bombay
Taylor, A.	Bombay
Taylor, Chas.	Bombay
Taylor, W. C.	Bombay
Terry, G. W.	Bombay
Temulji, Dr. B. N.	Bombay
Thacker, W.	Bombay
Thakur, Shripad Babaji (C.S.)	Broach
Thomson, Mrs.	Bombay
Tod, J.	*Europe*
Turner, Mrs. A. F.	Bombay
Thatcher, Capt. J. F. G. C.	Bombay
Turner, Montague C.	Bombay
Thom, E.	*Europe*
Thompson, B. W. O.	Ahmednugger
Trail, John	*Europe*
Trail, W. H.	Jhansi
Tytler, Stanley	Bombay
Uloth, H. W.	Bombay
Vidal, G. W. (C.S.)	Thana
Walcott, Colonel (C.B.)	*Europe*
Walker, A. C.	Bombay
Walker, T.	*Europe*
Whyte, Lieut. C. F.	Mhow
Willis, R. A.	Bombay
Wallace, James	Europe
Wallace, John (C.E.)	Bombay
Wallace, L. A.	*Europe*
Walton, Rienzi (C.E.)	*Europe*
Walton, E. M.	Bombay
Ward, Frank	*Europe*
Watson, E. Y.	Madras
Webb, W.	Bombay

Name.	Residence.
Weir, Dr. T. S.	Bombay
Wenden, H. (C.E.)	Bombay
Westmacott, Col.	Poona
Wise, Col.	*Europe*
Wise, H. S.	Karwar
Woodward, W. (C.S.)	Ahmedabad
Wroughton, R. C.	Poona
Wylie, R.	Gadechi
Westall, J.	Bombay
Whitehouse, Lieut. B. (R.N.)	*Europe*
Wodehouse, Lieut. F. W.	Kirkee
White, T. C. H.	Thana
Wimbridge, E.	Bombay
Yerbury, Major	*Europe*
Young, G. S.	*Europe*
Young, W. E.	Bombay
Yeld, Dr. H.	Bombay
Younghusband, A. D. (C.S.)	Ahmedabad
Yule, Major J. H.	Sipri, C. P.



F. B. del Mintern Bros. Chromo lith. London.

84 HIRUNDO FILIFERA, Steph. Wire-tailed Swallow
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NESTING IN WESTERN INDIA.

By Lieut. H. E. Barnes.

(*Continued from page 224.*)

84.—THE WIRE-TAILED SWALLOW.

Hirundo filifera, Steph.

The Wire-tailed Swallow occurs throughout the district, but is nowhere numerically common; it is a permanent resident, and breeds from the end of January to the end of May and again from the end of July to the beginning of October. The nest is deep, half saucer shaped, and is composed of pellets of mud, well lined with soft feathers, and is always placed in the vicinity of water, under the cornices of bridges, under arches of culverts, against the sides of wells, where there are projections under which they can build, in niches in buildings overhanging water, or under projecting ledges of rock. It is always placed against the side and a little below the roof or projection, only just enough space being left for the ingress and egress of the bird.

The eggs, three in number, are long narrow ovals in shape, a good deal pointed towards one end; they average 0·72 inches in length by about 0·52 in breadth; in colour they are white, beautifully speckled, spotted and blotched with various shades of reddish-brown. When fresh and unblown the ground colour is a delicate pink owing to the yolk showing through. They will not desert the nest even if the eggs be taken, but will lay a second, and if this be taken, even a third clutch in the same nest.

85.—THE MOSQUE SWALLOW.

Hirundo erythropygia, Sykes.

The Mosque Swallow occurs generally throughout Western India, but is more common in hilly districts (such as Mount Aboo), than in the open country. Most of them retire to the hills to breed about April, but a few remain, and nests are not unfrequently found in the plains. The nest, constructed of pellets of mud (which the bird procures from the banks of the nearest pond or river), is of a peculiar shape: it consists of a bulb-like chamber, five or six inches in length at one end, with a tubular passage, sometimes eight or nine inches long at the other, which the male continues to lengthen, even after the eggs are laid and while the female is sitting upon them. It has, not inaptly, been described as retort or rather half-retort shape. It is usually affixed to the roof of a cave, under a bridge or culvert, or to the under surface of a projecting ledge of rock.

The nest is well lined with soft feathers, and the eggs, three in number, are pure unspotted white, of a longish oval shape, and average 0·78 inches in length by 0·55 in breadth.

After the birds have once selected a site for their nest, they are very difficult to drive away. I have often broken open nests to see if any eggs had been laid, and they have always been repaired, and I have eventually obtained eggs from them. To such an extent is the constructive faculty developed in these birds, that they ofen make two or more nests before they are satisfied, and they are known to make a winter residence, in which eggs are never found. They are solitary breeders.

86.—THE INDIAN CLIFF SWALLOW.

Hirundo fluvicola, Jerd.

The Indian Cliff Swallow is not uncommon in some parts of the Deccan, but is somewhat locally distributed ; it occurs at Satara and Sholapur in some numbers; near Aboo and Deesa it is very rare; but at Ahmedabad there are several colonies; it is common but local in Nassick and Khandeish, and occurs at Baroda. It has not been reported from Sind. They are generally permanent residents where found; breeding twice in the year, from February to April, and again in July, August and the early part of September.

They build retort-shaped nests of mud, but very different to those of the Mosque Swallow, the bulb or chamber portion being affixed to the under-surface of a shelving rock, or under a bridge, with the tubes hanging down, or rather a little outwards, the whole looking not unlike a huge honeycomb. These clusters of nests are often of great size, containing from 30 to 200 nests, and are almost always in the immediate vicinity of water.

The nests are well lined with feathers; the eggs, three in number, are longish ovals in shape, and average 0·76 inches in length by about 0·53 in breadth. They are of two different types. In one they are pure unspotted white; in the other, they are more or less speckled, spotted or streaked with yellowish-brown; these markings are not clearly defined. The nests, especially the outer ones of a cluster, are often appropriated by Common Swifts and House Sparrows.

89.—THE INDIAN SAND MARTIN.

Cotyle sinensis, J. E. Gr.

The Indian Sand Martin is common in suitable places in most parts of Western India, but has not as yet been recorded from Ratnagiri. It is a permanent resident, breeding from November to March, or even later.

They bore holes in the sandy banks of rivers to a depth of from eighteen to forty or fifty inches, according to the relative hardness of the soil; and at the end of this hole or passage, which is enlarged, they make a slight nest of fine grass roots lined with soft feathers. The eggs, three in number, are pure white, quite devoid of gloss; they are oval in shape, and measure 0·68 inches in length by about 0·48 in breadth.

The nest holes are not solitary, but they are much more scattered than is usually the case with the British species.

90.—THE DUSKY CRAG MARTIN.

Cotyle concolor, Sykes.

The Dusky Crag Martin, with the exception of Sind, occurs more or less abundantly throughout our limits. It is somewhat solitary in its habits, rarely more than a single pair nesting in the same vicinity.

They have at least two broods in the year, and lay at different seasons in different parts of the country, but from January to March and from July to September are perhaps the best times to search for eggs. The nest is placed under a projection in the face of a rocky cliff, far from the haunts of man, or under the eaves of a house in his very midst. It is very like that of the Wire-tailed Swallow, but is smaller, more cup-shaped and pointed at the bottom, but like it is well lined with feathers. The eggs, three in number, are white with numerous spots and specks of various shades of yellowish or reddish-brown, but these markings are neither so bright nor so bold as those of the Wire-tailed Swallow; they average about 0·72 inches in length by nearly 0·52 in breadth. They appear to build in the same place for successive seasons, and do not desert the nest when robbed, but lay again within a fortnight or even less.

98.—THE ALPINE SWIFT.

Cypsellus melba, Lin.

The Alpine Swift occurs not uncommonly in mountainous tracts throughout the district, descending to the plains during the day but returning at night to roost. It is possessed of amazing powers of flight, and covers vast distances daily in search of food.

Its breeding haunts were long unknown, but it has now been ascertained to breed in the mountainous tracts of Nassick,* and will doubtless prove to do so in most other suitable places; they breed in deep clefts and fissures of almost inaccessible rocks; the nest is a very solid structure in comparison with that of the Common Swift; it is shallow, and is usually fastened to both sides of the fissure, which often stretches upwards into an overhanging cliff, and it is a most difficult nest to take. They do not seem to breed at any particular season, but eggs have been taken early in February.

Mr. Littledale found a colony of about eighteen nests in the face of a smooth overhanging crag in Dutchkut, Cashmere, but they were quite inaccessible.

Nassick, February. *J. Davidson, C.S.*

100.—THE COMMON INDIAN SWIFT.

Cypsellus affinis, J. E. Gr.

The Common Indian Swift is abundant throughout the district, and is a permanent resident; it has several broods in the year, and eggs and young may be found at all seasons.

They are very accommodating in the choice of nesting sites. Nests may be found in any of the following situations:—

In holes in the faces of old walls, mosques, forts, or other old buildings; in these cases the nests are detached, unless the hole happens to be large enough to contain two or more.

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* *Vide* B. N. H. S. Journal, p. 17, No. 1, Vol. III.

Under the eaves of houses, tombs, &c., several nests together, with perhaps a few detached ones.

In the doorways and under roofs of stables and other outhouses, or between closely-set rafters.

Under the roofs of caves they occur in clusters; often containing fifty or more nests, with isolated ones, or small clumps of two or three in close proximity to the central mass.

Their nests, which take a long time to construct, are composed of agglutinated saliva, mixed with a few feathers and straws; they are of no particular shape, but if in a hole or other confined place, it necessarily takes its shape; they are at times long and narrow, occasionally almost round, but generally they are of an irregular oblong shape.

The entrance is a portion of the upper part of the nest left unfinished.

The eggs, three in number, are long narrow ovals, measuring 0·78 inches in length by 0·57 in breadth. They are pure glossless white, with a pinkish tinge when fresh and unblown.

As previously noted they often appropriate nests of the Cliff Swallows.

102.—THE PALM SWIFT.

Cypsellus battassiensis, J. E. Gr.

The Palm Swift is most abundant in those districts in which the toddy palm abounds, but where these trees are absent, the Palm Swifts are absent also.

They breed twice a year, from March to July; the nest is almost always placed in a furrow formed by a plait in the under-surface of a bent palm leaf towards the centre. It is a tiny watch pocket in shape, composed of vegetable down, often mixed with feathers (parrots' and doves' especially), and is cemented to the leaf by agglutinated saliva; the nest itself is soft, but the upper edge is hard and cordlike. The eggs, three in number, are perfect miniatures of those of the Common Swift, measuring 0·7 inches in length by about 0·46 in breadth.

Bombay, May. *H. E. Barnes.*

103.—THE EDIBLE NEST SWIFTLET.

Collocalia unicolor, Jerd.

The Edible Nest Swiftlet occurs on the Malabar Coast, breeding during the months of March and April. The nests, composed of inspissated saliva, are half saucer-shaped, and are affixed to the sides of rocky caves, in small clusters, but detached nests are not unfrequent. The eggs, two or three in number, are, as a rule, long narrow ovals in shape, measuring 0·83 inches in length by about 0·54 in breadth; in colour they are dull glossless white.

Nests of the first make are white, and are very valuble; those of the second are not so clear, and are mixed with extraneous matter, and do not command so high a price in the Chinese markets as the others. Nests of the third make (which are left for the birds to breed in) are discoloured and are much mixed with feathers, straws, &c., and are of no commercial value. The right to collect the nests is sold annually by Government, but the revenue derived from it is very insignificant.

Vingorla, Feb. and April. *G. Vidal, C. S.*

104.—THE INDIAN CRESTED SWIFT.

Dendrochelidon coronata, Tick.

The Indian Crested or Tree Swift is not uncommon at Ratnagiri, and occurs rarely all along the Western ghats. It has been recorded from Mhow and from the hilly jungles of the Panch Mahals. It is not uncommon in the broken hilly land below the ghats and along the plain forest south of the Satpooras. It is a permanent resident where found, breeding from April to June. The nest, which is small, is a shallow half-saucer in shape, no larger than a rupee, and is composed of thin flakes of bark, glued by the bird's own saliva to the dead branch of a tree. It is about half an inch in depth, and is nowhere more than one-eighth of an inch in thickness. The egg, there is only one, is oval in shape, measuring 0·9 inches in length by 0·57 in breadth, and is dull glossless white in colour.

The nest is easy to find, as the cock-bird, while the hen is sitting for most of the day, keeps flying within a hundred yards of the nest. He continually calls and is answered by the female from the nest, which is generally on a thin bare branch, from eight to twenty feet from the ground.

Panch Mahals, May. *H. Littledale, Esq.*
Western Khandesh, Feb. to April. *J. Davidson, C.S.*

107.—THE JUNGLE NIGHT JAR.

Caprimulgus indicus, Lath.

The Jungle Night Jar is not uncommon on the Western ghats, and occurs also on the Aravelli Range. It breads from March to the middle of May, making no nest, but depositing its two eggs in a slight depression on the bare ground under the shelter afforded by a low bush. They are oval in shape, measuring 1·2 inches in length by about 0·88 in breadth; in colour they are a pale salmon pink, thickly blotched and streaked with purplish and olive brown.

Nassick, April and May. *J. Davidson, C.S.*

108.—THE NILGIRI NIGHT JAR.

Caprimulgus kelaarti, Bly.

The Nilgiri Night Jar has been recorded from the Konkan; it is only doubtfully distinct from the Jungle Night Jar, *C. indicus*, and might with advantage be suppressed. The eggs are exact facsimiles of those of the latter bird.

Nilgiri, in Coll. *H. E. Barnes.*

111.—THE GHAT NIGHT JAR.

Caprimulgus atripennis, Jerd.

The Ghat Night Jar has been recorded from the forest tract west of Belgaum, and Jerdon mentions it from the Malabar Coast. As usual with all the Night Jars, it lays two eggs on the bare ground. They are of a dark salmon colour, spotted and blotched with purplish and reddish-brown; they measure 1·1 inch in length by about 0·73 in breadth.

S. India, in Coll. *H. E. Barnes.*

112.—THE COMMON INDIAN NIGHT JAR.

Caprimulgus asiaticus, Lath.

The Indian Night Jar is common throughout the district, and is a permanent resident, breeding from March to September, but most eggs will be found in June and July. It is common in scrub jungle, but is rare in deep forest. The eggs (there is no nest) are two in number, and are laid on the bare ground. They vary from a warm pinkish stone colour to a deep salmon pink, and are clouded, blotched, and streaked with different shades of pale reddish and purplish-brown. They measure 1·04 inches in length by 0·77 in breadth.

Deesa, &c., April and May. *H. E. Barnes.*

113.—SYKES' NIGHT JAR.

Caprimulgus mahrattensis, Sykes.

Sykes' Night Jar is very common in Sind, where it is a permanent resident, but becomes much less common towards the South. It breeds from February to August, laying its two eggs in a depression on the ground, occasionally in the open, at other times under a tussock of grass or clod of earth. They are of a light pale stone or clayey colour, with large blotches and clouds of neutral tint. They measure 1·15 inches in length by about 0·8 in breadth.

Hyderabad (Sind), 18th April to 5th May.	*H. E Barnes.*
Eastern Narra (Sind), Feby. to August.	*S. Doig, Esq.*

114.—FRANKLIN'S NIGHT JAR.

Caprimulgus monticolus, Frank.

Excluding Sind, Franklin's Night Jar is more or less commonly distributed throughout the district, breeding in the manner usual with the genus, from April to July. The eggs are of a deep salmon colour, exactly similar to that of the Jungle Night Jar, but the eggs are much larger; they are spotted and blotched with pale purplish and clayey-brown. They average 1·2 inches in length by nearly 0·83 in breadth.

Mount Aboo, June.	*H. E. Barnes.*
Neemuch, June and July.	,,
Nassick, April to June.	*J. Davidson, C. S.*

117.—THE COMMON INDIAN BEE-EATER.

Merops viridis, Lin.

The Common Indian Bee-eater is most abundant throughout the entire district.

They breed in April in holes in sandy banks of nullahs, in the sides of cuttings, and occasionally in almost level ground.

They cut a fresh hole each season, using their bills to loosen the earth, and scraping it away with their claws. The holes vary in depth from two to four feet or more, according to the nature of the soil, and are barely two inches in diameter. They are cleanly cut and are quite circular, with two little channels made by the feet of the bird in entering and leaving the passage.

There is no nest. The eggs are laid on the bare ground, in a cavity or enlargement at the end of the hole. They are usually four in number, but sometimes six or seven are found. They are almost spherical in shape, measuring 0·73 inches in length by 0·7 in breadth. In colour they are milk-white, and are brilliantly glossy when fresh. They seem to lay their eggs at intervals, as very often fresh and incubated eggs or nestlings are found in the same nest.

118.—THE BLUE-TAILED BEE-EATER.

Merops philippinus, Lin.

The Blue-tailed Bee-eater occurs sparingly throughout the district, but appears to be more common in Gujarat, where it breeds during the hot weather in holes in the banks of rivers.* They also breed in Khandesh, making their nest-holes in the face of the Satpooras early in May.

The eggs are similar to those of the Common Indian Bee-eater but are larger, measuring 0·88 inches in length by 0·76 in breadth.

Baroda, May.	*H. Littledale, Esq.*
E. Narra (Sind), July.	*S. Doig, Esq.*
Khandesh, May.	*J. Davidson, C.S.*

123.—THE INDIAN ROLLER.

Coracias Indica, Lin.

The Indian Roller, more commonly known as the Blue Jay, is abundant throughout the greater part of the district. It is a permanent resident as a rule, but in some localities retires to the better wooded tracts to breed.

They build in holes in trees, in walls, under eaves of houses, &c. The nest is a mere collection of rubbish, such as rags, fibres, tow, &c., thrown together anyhow. The eggs, four in number, are glossy china-white, of a broad oval shape, occasionally almost spherical. They measure 1·3 inches in length by rather more than an inch in breadth.

The nesting season extends from April to July, but May and June are the months in which most eggs are laid.

Mr. Davidson has kindly furnished me with the following note: In the Satara, Poona, and Nassick ghats they are apparently absent during the hot weather, but breed abundantly in the Satpooras.

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* *Vide* B. N. H. S. Journal, p. 32, No. 2, Vol. I.

127.—THE BROWN-HEADED KINGFISHER.

Pelargopsis gurial, Pears.

The Brown-headed or Stork-billed Kingfisher is the least common of all the family, and only occurs as a straggler in most places of the district. It has not been recorded from Sind. Mr. Davidson, C.S., found it breeding in Nassick and West Khandesh in April and May in holes in river banks generally about a foot deep. A female I shot in Neemuch in March had good sized eggs in her ovaries, and I have also received notes of nesting holes from other places.* The eggs are stated by Mr. Theobald to be four in number, in shape round and pure white. He gives the dimensions as 1·09 inches in length by 1·02 in breadth, but this is less than eggs of the much smaller White-breasted Kingfisher measure, and must, I think, be a mistake.

129.—THE WHITE-BREASTED KINGFISHER.

Halcyon smyrnensis, Lin.

The White-breasted Kingfisher is a common permanent resident throughout the entire region, breeding in holes pierced in the banks of rivers, canals, and tanks, and in the sides of wells, from March to the end of May and again in July and August. There is no nest. The eggs, from four to seven in number, are deposited in a cavity at the end of the passage; they are glossy china-white when first laid, but soon become discoloured. In shape they are very broad ovals, some being almost spherical; they average 1·12 inches in length by 1·03 in breadth.

I have never found the least semblance of nest, but Mr. Baker writing from Silchar, North Cachar, tells a very different tale. He says, *in epist.*:—"*Halcyon smyrnensis* always build their nests here of moss, and generally under an overhanging stone on the bank of some small stream, which is entirely covered in with jungle. The people here declare that it never makes a hole in a bank, and they do not consider it to be a Kingfisher, calling it quite a different name." In another letter he says:—"I was halting on the bank of a river, some eight or ten miles from Guilong, and during the day noticed a pair of these birds constantly visiting a place under an old rotten tree. On my inspecting it I found that they had built, or rather nearly built, a nest in a crevice between two roots. It was composed of moss with a few skeleton leaves, and was in appearance like a Willow Wren's nest, only of course very much larger. I did not touch the nest as I wanted to watch the birds; so I fetched my glasses, and seated myself on a heap of stones about fifty yards away. One of the birds soon came back with a large piece of moss in its beak. This it commenced to jam in between the nest and the tree, hanging on to a root all the time and working most vigorously. There seemed to be no weaving or twisting, but the bird seemed to work the nest into shape as it went on. The nest when examined afterwards was found to consist of layers of moss, one on the top of the other. It fell to pieces directly it was pulled out, and I have not seen a single nest which had sufficient consistency to stand handling." Mr. Baker is a careful observer, and I feel certain that he has made no mistake.

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* *Vide* B. N. H. S. Journal, p 32, No. 2, Vol. I.

This total change of habit is curious, and it would be interesting to learn if any other naturalist has met with a similar experience.

134.—THE INDIAN KINGFISHER.

Alcedo bengalensis, Gm.

The Indian Kingfisher is common throughout the district except in Sind, where it is replaced by the closely allied, even if distinct, European Kingfisher, *Alcedo ispida.* They breed during the hot weather in holes in the banks of rivers and streams. They make no nest, but a few small fish bones are generally found close to the eggs; but these are only castings, and are evidently not intended for a nest. The eggs, from five to seven in number, are glossy china-white (pinkish-white when fresh). In shape they are broad ovals, occasionally almost spherical. They measure 0·8 inches in length by 0·68 in breadth.

134 *bis.*—THE EUROPEAN KINGFISHER.

Alcedo ispida, Lin.

The European Kingfisher differs so slightly from the Indian form, that I do not consider the latter entitled to specific distinction, but until the question is definitely settled, it must be retained. The European Kingfisher is very common in Sind, where it is a permanent resident, breeding during the hot weather. The eggs are not distinguishable from those of the Indian bird.

(Hyderabad Sind), May and June. *H. E. Barnes.*

136.—THE PIED KINGFISHER.

Ceryle rudis, Lin.

The Pied Kingfisher occurs in suitable localities throughout the presidency. It is a permanent resident, breeding during the summer months in holes in the banks of streams and rivers. The eggs, four to six in number, are glossy china-white, and are usually of a broad oval shape, but are liable to variation. They measure 1·15 inches in length by 0·9 in breadth.

There are three or four other species of this family mostly confined to the sea coast in the South. They are probably permanent residents, but I can find no record of their breeding.

140.—THE GREAT HORNBILL.

Dichoceros cavatus, Shaw.

The Great Hornbill is a permanent resident in the forest clad portions of the Sahyadri range, where it is not uncommon. They feed principally on ripe berries and fruit, leaving their usual haunts during the winter in search of them. They kill and eat snakes when they find them.

They breed during the hot weather in holes in rotten trees. The female is a close sitter, closing up the entrance hole with her own ordure, only leaving a long narrow slit through which she obtrudes her bill to receive the berries and other food that her mate brings her. She does not leave the nest hole until the eggs are hatched out. The eggs, three in number, vary in colour from pure white to pale-yellow. They measure 2·7 inches in length by about 1·8 in breadth.

141.—THE MALABAR PIED HORNBILL.

Hydrocissa coronata, Bodd.

The Malabar Pied Hornbill is a not uncommon permanent resident in the southern portion of our district, but I cannot find any record of its breeding.

144.—THE COMMON GREY HORNBILL.

Ocyceros birostris, Scop.

The Common Grey Hornbill has not been recorded from Sind, and only doubtfully so from the Deccan. Generally speaking it is not uncommon in all the well-wooded tracts of Rajpootana and Gujerat. In the Gir forest in Kattywar it is very common. It is fairly common in the mango groves in the Nassick and Khandesh districts. It breed during April and May in the same manner as others of the family. The eggs, three to five in number, are dull-white, and are usually more or less discoloured. They are oval in shape, and measure 1·7 inches in length by about 1·22 in breadth.

Khandesh, April to May. *J. Davidson, C.S.*

145.—THE JUNGLE GREY HORNBILL.

Tockus griseus, Lath.

The Jungle Grey Hornbill is more or less common in the forest-clad hills in the south of the district, occurring as far north as Khandalla.

It is a permanent resident, but I can find no record of its breeding within our limits.

147.—THE ALEXANDRINE PAROQUET.

Palæornis eupatria, Lin.

The Alexandrine Paroquet does not occur in Sind, and appears to be altogether absent from the South. It occurs and breeds on the Satpoora Hills, but is rarely seen on the Satmallis in the south of the district. I met with a large flock on one occasion only at Neemuch, Rajpootana. The greater number if not all of the young birds offered for sale in the Bombay market come from Central India from hills in the Jubbulpur district, where the birds are common. They breed in holes in trees very late in the year, nestlings being exposed for sale about Christmas. The eggs, four in number, are oval in shape, measuring 1·5 inches in length by about 1·15 in breadth.

They are white when first laid but soon become discoloured.

W. Khandesh, Nov. to January. *J. Davidson, C.S.*

148.—THE ROSE-RINGED PAROQUET.

Palæornis torquatus, Lin.

The Rose-ringed Paroquet is a common permanent resident throughout the entire district, breeding generally in holes in trees, occasionally in holes in old walls and buildings, and under the eaves of outhouses. From the middle of February to about the middle of April is about the best time to search for nests. The eggs, four in number, are pure glossless white; they are oval in shape, pointed at one end, and measure 1·2 inches in length by about 0·95 in breadth.

149.—THE ROSE-HEADED PAROQUET.

Palæornis purpureus, P. L. Z. Mull.

With the exception of Sind the Rose-headed Paroquet occurs generally throughout the district, but is much less common and is more locally distributed than the Rose-ringed Paroquet. They retire to the hills about the end of March to breed, but on one occasion at Poona I saw nestlings exposed for sale on Christmas Day, which had been taken at Khandalla.

They nest in holes in trees. The eggs, four in number, are exact miniatures of those of *P. torquatus,* measuring an inch in length by 0·8 in breadth.

W. Khandesh, February.	*J. Davidson, C. S.*
Saugor, C. P., March.	*H. E. Barnes.*

151.—THE BLUE-WINGED PAROQUET.

Palæornis columboides, Vig.

Within our district the Blue-winged Paroquet is confined to the Sahyadri range. I can find no account of its nesting, but great numbers of young birds are exposed for sale in the Crawford Market, Bombay, every hot season. The dealers say they come from the ghats.

158.—THE SIND PIED WOODPECKER.

Picus sindianus, Gould.

This Woodpecker seems to be confined to Sind, where it is very common in suitable places. It is a permanent resident, breeding during March and April, laying its eggs in holes in trees, which are cut by the birds themselves.

The eggs, three in number, are glossy milk-white, and measure 0·85 inches in length by nearly 0·67 in breadth.

Hyderabad (Sind), March and April.	*H. E. Barnes.*
Eastern Narra (Sind), 2nd April.	*S. Doig, Esq.*

160.—THE YELLOW-FRONTED WOODPECKER.

Picus mahrattensis, Lath.

The Yellow-fronted Woodpecker is generally distributed throughout the district, but is rare in Sind, where it is replaced to a great extent by *P. sindianus.* It is a permanent resident, breeding during February, March and April in holes which it cuts in trees. There is no nest. The eggs, three in number, are glossy milk-white ovals, shaded delicate pink when fresh and unblown. They average 0·87 inches in length by nearly 0·68 in breadth.

Deesa, March.	*H. E. Barnes.*
Nassick and Khandesh, Feb. to April.	*J. Davidson, C. S.*
Baroda, Feb. to April.	*H. Littledale, Esq.*

164.—THE SOUTHERN PIGMY WOODPECKER.

Yungipicus nanus, Vig.

The Southern Pigmy Woodpecker occurs sparingly all along the Sahyadri range, where it is a permanent resident, breeding during February and March. It is exclusively a jungle bird and rare, except in the broken country below the ghats.

In West Khandesh, where it is abundant, in one week in the beginning of March, Mr. Davidson, C.S., took twenty nests. They were almost all in thick branches, about 16 feet up a tree that had been pollarded for rabi cultivation, and with two exceptions all contained callow young on that date. It cuts a tiny hole in the side of a large branch of a tree, which is generally more or less decayed. There is no nest. The eggs, three or four in number, are glossy-white and measure 0·67 inches in length by 0·5 in breadth.

W. Khandesh, March, nestlings.	*J. Davidson, C. S.*

166 *bis*.—THE LARGE GOLDEN-BACKED WOODPECKER.

Chrysocolaptes delesserti, Malh.

The Woodpecker occurs not uncommonly all along the Sahyadri range and adjacent forests. It is a permanent resident, and of course breeds, but I cannot find any satisfactory account of its nesting. It is said to breed from December to Februry in large holes, which it cuts in trunks of trees, at various heights from the ground, laying but a single egg, which is glossy white and of a broad oval shape.

167.—THE BLACK-BACKED WOODPECKER.

Chrysocolaptes festivus, Bodd.

This very handsome Woodpecker has been recorded from Ratnagiri but is not common. It occurs, but very rarely on Mount Aboo and the adjacent hills. It is fairly common throughout the ghats, both in Nassick and Khandesh, also on the Satpooras. It cuts a very large nest hole and breeds early, young, able to fly, having been found in the Satpooras at Christmas.

It generally lays but one egg, but Mr. Davidson, C. S., on one occasion obtained a young one and a rotten egg from the same nest (this was in March). It generally cuts several holes in the tree on which it nests, as well as in the adjacent ones.

175.—THE SOUTHERN YELLOW-NECKED WOODPECKER.

Chrysocolaptes chlorigaster, Jerd.

Occurs throughout the jungles in the Western Satpooras and in the northern part of the ghats, but is nowhere abundant. It is a permanent resident, but the eggs do not appear to have been taken.

179.—THE MADRAS RUFOUS WOODPECKER.

Micropternus gularis, Jerd.

The Madras Rufous Woodpecker occurs along the Sahyadri range and adjacent forests as far north at least as Khandalla. It is a permanent resident, but I can find no account of its nesting habits.

Several observers have noticed the fact of its head and tail being generally smeared with resin, and also its habits of hammering at ants' nests, in which most probably, like its northern congener, *M. phæoceps,* it lays its eggs.

180.—THE GOLDEN-BACKED WOODPECKER.

Brachypternus aurantius, Lin.

The Golden-backed Woodpecker is very common throughout the northern half of the presidency. It is a permanent resident, breeding from March to July, cutting its nest-hole in the trunk of a tree, generally a mango or other soft-wooded one. The eggs, three in number, are oval in shape, somewhat pointed at one end. They measure 1·11 inches in length by 0·8 in breadth, and are glossy milk-white, with a delicate salmon tinge when fresh and unblown.

In the Deccan it appears to retire to the hills to breed.

Deesa, &c., April and May. *H. E. Barnes.*

181.—THE LESSER GOLDEN-BACKED WOODPECKER.

Brachypternus puncticollis, Malh.

This Woodpecker replaces the last in the south. Its nesting habits are precisely similar.

182.—THE SIND GOLDEN-BACKED WOODPECKER.

Brachypternus dilutus, Bly.

This bird does not differ in any respect from *B. aurantius*, and has been rightly suppressed in most recent ornithological works.

There are several other Woodpeckers, occurring more or less rarely, on the forest-clad hills of Western India, mostly in the south. They are probably permanent residents, but of their nestings I can find no record.

193 *bis.*—THE WESTERN GREEN BARBET.

Megalæma inornata, Wald.

The Western Green Barbet is not uncommon in the Satpoor and Dang country below the ghats. It is very common at Aboo and in the jungles of the Panch Mahals. Many observers have reported it from the ghats, but there it is certainly less common than *M. viridis.* It does not occur in Sind. It is a permanent resident, breeding during March and April, drilling its nest-hole in a large branch of some soft-wooded tree.

The eggs, three or four in number, are dullish-white in colour, and measure 1·3 inches in length by about 0·9 in breadth.

Aboo, March to April. *H. E. Barnes.*
Satpooras, March to April. *J. Davidson, C. S.*

194.—THE SMALL GREEN BARBET.

Megalæma viridis, Bodd.

The Small Green Barbet within our limits seems to be confined to the Sahyadri range and adjacent forests.

It is a permanent resident, breeding from March to May, in the manner usual to all the members of the group. The eggs, three or four in number, are oval in shape, and measure 1·1 inches in length by 0·86 in breadth.

197.—THE CRIMSON-BREASTED BARBET.

Xantholæma hæmacephala, P. L. Z. Mull.

The Cooper Smith is rare in Sind, but is very common in all other parts of the Presidency. It is a permanent resident, breeding from the end of February to about the middle of April. They select a branch which, however sound it may appear externally, is always decayed and hollow within. They cut a circular hole in this, and at the bottom of the hollow, often a considerable depth from the opening, they deposit their eggs, making no nest. The eggs, three in number, are long narrow ovals measuring nearly an inch in length by about 0·7 in breadth. They are pure white.

199.—THE CUCKOO.

Cuculus canorus, Lin.

I can find no authentic record of an egg of the Cuckoo having been found within our limits, but I have no doubt of its breeding freely on Mount Aboo and other wooded hills in Western India as I, in common with other observers, have procured young birds that must have been bred in the vicinity. Mr. Davidson, C.S., says that old birds pass through Dhulia in Khandesh in June, at which time they call vigorously, and in the Satpooras in July a dozen may be heard calling in a morning. Again in August and September, numbers, both young and old, pass through Dhulia southwards, showing that they must have been bred in the Satpooras at that time.

203.—THE INDIAN CUCKOO.

Cuculus micropterus, Gould.

Is found throughout the ghats from May to August, and its metallic cry can be heard from a considerable distance. It is a shy bird and undoubtedly breeds at this time.

205.—THE COMMON HAWK CUCKOO

Hierococcyx varius, Vahl.

Is a permanent resident in the northern portion of Khandesh, and occurs in Nassick at the end of the hot weather and during the rains. It appears to lay frequently in the nests of the various Babblers, as eggs and young have been taken from them in the month of July by Mr. Davidson, C.S.

212.—THE PIED CRESTED CUCKOO.

Coccystes jacobinus, Bodd.

The Pied Crested Cockoo is a monsoon visitant, and occurs more or less commonly throughout the district, but is much more abundant towards the north, becoming comparatively rare in the south. It breeds soon after its arrival, placing its egg as a rule in a nest of one of the *malacocerci.**

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* Capt. Sadler took an egg from a nest of *Iora zeylonica* during the rains at Baroda.

The eggs, I cannot say how many are laid, are glossy spotless blue in colour, darker or lighter in different specimens. They are roundish ovals in shape, measuring 0·94 inches in length by 0·73 in breadth.

The eggs can be distinguished from those of the Bush Babbler by their spherical shape, and from those of the other Malacocerci by their smaller size, but the only really authentic specimens are those extracted from the oviduct of the female. A single egg, as a rule, is laid in each nest, but Mr. Littledale once found two Cuckoo eggs and one Babbler's in the same nest, but this was an exception, and I am not aware of any other collector meeting with the same luck.

The eggs of the rightful owner of the nest are not destroyed by the parent Cuckoo, but as the young Cuckoo is the sole occupant of the nest, he probably makes away with his nest fellows as soon as they are hatched.

Mhow, October.	*H. E. Barnes.*
Deesa, June to August.	,,
Hyderabad (Sind), August.	,,

214.—THE KOEL.

Eudynamis honorata, Lin.

With the exception of Sind, where it is rare, the Koel is very common. It is usually a seasonal visitant only, but in some districts it appears to be a resident. They lay their eggs in the nests of the Common Crow, usually one in a nest, occasionally two, but I once found three, but as these eggs differ from each other, they were probably the produce of different birds. Mr. Davidson, C. S., on one occasion found four eggs in a crow's nest, evidently from the markings the eggs of two birds, but this was late in the year, after the Koel's eggs had been persistently taken, and the number of crows which had not hatched off was very few.

Mr. Littledale also found four eggs in a nest, *vide* B. N. H. S. Journal, p. 32, No. 2, Vol. I.

I have never found the crow eggs broken, but others have; in these cases, I believe the eggs to have been broken accidentally. The visit of the female Koel to the nest is a hurried one, and when her presence is detected by the crows, her departure is still more so, and eggs are fragile.

There can be no doubt that the young koel ejects the young crows from the nest, as I once found the latter on the ground, under a tree, in which was a crow's nest, that on examination was found to be occupied by a solitary nestling koel. The eggs vary much both in colour and size; pale sea-green, oily-green, dull olive-green, and dingy stone coloured varieties all occur. The markings are olive, reddish-brown, and dull-purple. They average 1·2 inches in length by 0·92 in breadth.

216.—THE SMALL GREEN-BILLED MALKOHA.

Rhopodytes viridirostris, Jerd.

Within our limits the Small Green-billed Malkoha seems to be confined to the extreme south, where it is said to be a not uncommon permanent resident.

Mr. Davidson, C. S., got a nest from Malwa in July containing two eggs, *vide Bombay Gazetteer,* 1880.

217.—THE COMMON COUCAL.

Centrococcyx rufipennis, Ill.

The Common Coucal or Crow Pheasant is abundant throughout the district, with the exception of Sind, where it is replaced by the closely allied *C. maximus.* It is a permanent resident, breeding from May to August, making a large, irregular, globular-shaped nest, generally domed. The materials used in its construction are sticks, twigs, grass, &c. It is placed in the centre of a thorny thicket or high up in a tree. In the former position it is well hidden, but in the latter it is more conspicuous, but not always easy to get at. The eggs, usually three in number, are broad, white, chalky ovals, rather pointed at both ends, measuring 1·43 inches in length by rather less than 1·17 in breadth.

217 *quints.*—THE SIND COUCAL.

Centrococcyx maximus, Hume.

This bird is a common permanent resident near Hyderabad and other parts of Sind, where it takes the place of *C. rufipennis,* breeding about the same time, in the same manner, and laying precisely similar eggs.

Hyderabad (Sind), July to Sept.	*H. E. Barnes.*
Narra (Sind), June to July.	*S. Doig, Esq.*

219.—THE SOUTHERN SIRKEER.

Taccocua leschenaulti, Less.

Within our limits the Southern Sirkeer seems restricted to the south-west, extending as far north as Khandalla. It is a permanent resident, and Mr. Vidal, C. S., obtained eggs, but I can obtain no description of them.

220.—THE BENGAL SIRKEER.

Taccocua sirkee, J. E. Gr.

Excluding that portion of the Presidency south of Bombay, and perhaps the province of Sind in the north, the Bengal Sirkeer is fairly common in the remaining portion of the district.

It is a permanent resident, breeding from May to August, making its nest in a fork in some thick bush or densely foliaged tree. It is a large flattish structure, composed of twigs, lined with green leaves. The eggs, two or three in number, are exact miniatures of those of the Crow Pheasant. They measure 1·39 inches in length by about 1·01 in breadth.

W. Khandesh, May. *J. Davidson, C. S.*

222.—THE CENTRAL INDIAN SIRKEER.

Taccocuat affinis, Bly.

I must confess to a great amount of scepticism regarding this bird's title to specific distinction, but Captain Butler records it as "not common in Sind," so it ought to find a place in this paper.

I met with it at Saugor in the Central Provinces, when I obtained a nest containing a single egg; this I left undisturbed, expecting to obtain a full clutch, but the bird forsook the nest. This egg does not differ from those of *T. sirkee,* except that it is a trifle larger.

A CREEK OF THE KONKAN.

By W. F. Sinclair, C.S.

(*Read at the Society's Meeting on the* 19*th Feb.* 1889.)

I have to describe to you a voyage on a creek of the Konkan; that is, on the estuary of one of the numerous rivers rising in the ghats, or between them and Arabian Sea, and flowing westward into that sea. These are, throughout the Konnkan south of Bombay, the main highways of heavy traffic. The tides, flowing not only up and down the creeks, but up and down the coast, are as good as two slow trains a day each way; and the usual alternation of land and sea breezes tends still further to facilitate the fine-weather coasting traffic.

The waters which I have chosen to illustrate to-day are those of the great Janjira fiord and of its northern branch, the Malati Creek, which is the mouth of a small and nameless stream rising in the Habsan plateau. Suppose that we are standing early on a cold weather morning at the bottom of a saucer-shaped valley in this plateau, perhaps five miles across. All round the hills rise to nearly a thousand feet above us, their summits usually hog-backed or flat, their flanks sloping and thickly timbered. A couple of exceptional crags show the ruins of old-time fortresses against the sky. The bottom of the saucer is cleared and cultivated, and in its very centre is a patch of salt marsh, partly covered with mangrove scrub. Into this projects a little rocky point, on which is our position.

The in-coming tide of the creek at its foot, and a couple of coasting craft loading up with fuel for Bombay, are the only signs of the neighbourhood of the sea, which is, indeed, nearly twenty miles away by the course. Off the landing place our own boat is lying ready, and the dinghy comes ashore for us. For in these creeks it is good navigation to get over the shallowest water against the last of the flood, and we have less than an hour left of that. We draw only three feet; the coasters, which draw six, are beneaped; that is, they must wait for a spring tide to get away.

That you may understand what follows, I must describe the party. The captain, fully clothed after his fashion, squats in the very stern to steer. Four men are at the oars amidships, and two forward use long bamboo poles, much more efficient things in shallow currents. These are got up like the gentleman in Midshipman Easy, on the principle of duty before decency. A clout, a cap, and a knife (hung round his neck) is the outfit of each; whereof we shall presently see the reason. For the purpose of destruction we require a couple of sporting griffins, who are posted one on each bow, with strict injunctions to keep the muzzles of their guns out board; and the courteous stranger is invited to take his seat aft beside the commander of the expedition, who has now the honour to address you. Lastly, the ever-useful Don Domingo is busy making coffee over three sticks, burning in a little box full of sand. There is no awning, it would be much in the way, and afloat the direct rays of the sun are weakened by the rising though invisible vapour, and less dangerous than those reflected from the surface, which seem to burn through the eye into the brain. Against these we are armed with smoky spectacles, but don't want them so early in the morning, for our voyage is Westward Ho !

As we push slowly down against the flood, we meet a shoal of grey mullet playing and jumping, and the boys quarrel as to whether or no they are salmon-trout, but are told that there are no trout in India, and to keep their eyes open and mouth shut. Presently a crack opens in the edge of our saucer, and we head south-westward through a wooded gorge, the bottom of which, not half a mile wide, is chiefly occupied by the creek and its mangrove swamps. The neap-tide has failed to cover a little sandy islet, and on it a dozen grey and white birds, rather larger than snipe, sit still and close together. As we come up, they fidget and rise, and in an instant the gunner on that side lets fly at them. A couple fall nearly ahead of the boat; we steer for one and pick it up with a landing net, and a man jumps over board and retrieves the other. The griffin who has not shot them, rebukes his fellow griff for shooting " snippets," who retorts that they are just as hard to shoot as "snipe" and "*A vis sapidissima in patina.*"

He has not much Latin, this boy ; the other has none, but refuses to consider himself shut up, and appeals to the quarterdeck. We find that one bird is a red shank and the other a green shank. Both are large sandpipers of the genus Totanus, and have been waiting on the bank for the ebb. Most shore birds, and especially the sandpipers and dwarf plovers, have this habit, feeding alone or in small and scattered flocks on the foreshore, and packing for repose at high water. Both of our birds are good for the pot, as implied in their slayer's Latin tag.

As we pass on, we find on similar banks several small flocks of curlews, and what our men call young curlews, and so they look, but they rise with a single sharp note, often and quickly repeated, which marks them for whimbrel, a smaller bird and more delicate eating. The tide is now with us, and the water has widened and deepened so we get in the oars and hosit the sails to the morning land wind, keeping on the outside curve of the stream, where the water is deepest and we can steer pretty close to the mangroves.

These, by the way, are true mangroves, very different from the small-leafed, greyish Avicennia of Bombay harbour. Their great stacks of roots are hidden by the flood-tide, but the laurel-like leaf and heavy scent of the flowers filling the air of the creek distinguish them at once.

There are lots of small birds fluttering indistinguishable in the trees, and on the outer boughs every here and there a blue kingfisher. Our griffins prepare to make war upon these, talking about hats ; but we disapprove of killing pretty little birds to put in hats, and check them, observing that there is fitter game ahead, where the glasses show a snake-bird, which looks almost white in the morning sun, the sign of plumage in good condition. As the boat closes with him, he rises and flies off before her ; the gunners grumble, and are told to hold their tongues and wait a minute ; sure enough, about half a mile ahead the bird turns and comes back almost over the boat. A couple of men have already slipped into the dinghy astern with a landing net, and as they hear the shot, slip the painter, while the sail-trimmers jump to their feet and put the boat under bare poles in an instant, and the stern grapnel goes overboard with a splash.

The bird is only winged, and the chase would be a long one, but he has foolishly dived with the ebb tide and comes up near enough to the boat for a second shot to catch him in the head and neck, and in a minute more he is in the landing net, the grapnel coming up and the sails coming down. The shot has put up a flock of teal a mile ahead, which wheel about a little and then settle, as the bowman observes, just where we got a couple two years ago, in a back water behind a little island. As we come down outside, we anchor, man the dinghy, and send a gunner ashore to stock them there, and he gets a couple. Meanwhile Domingo has done skinning the snake-bird, and the handsome scapular plumes are pressed between two old cigar-box boards lashed with twine, the rest going over board to be presently picked up by a brahminy-kite that has been following us. He can hardly lift the carcase, but at last manages to strand it on an island.

Here the creek opens into a triangular lake, with sides of about a mile each, and we fall in with a couple of fishing canoes, and chuck a rupee into one of them. Thereupon the fisherman begins to chuck mullet aboard us till it is clear that the supply exceeds the demand, and we call out to "'vast heaving." It is getting near breakfast time, and the mullet come in handy, so the gunners are called aft and the meal cooked and served—a trifle roughly perhaps.

Suddenly, while every one is busy with his plate, there is a tremendous rush in the air and splash in the water not half a cable off. One's first idea is that of a bolt fallen from the blue; but before the spray has well got back to the surface, an osprey emerges from it with a two-pound mullet in his claws and sails off to an islet, where his breakfast-table has been established for many generations. As the boat rounds it, the scene is extremely beautiful. A new lake, near six miles long and four wide, opens before us, the shore still mountainous and well wooded, the islands covered with mangrove. The wind has now shifted to the westward, and the boat is close-hauled, but makes good way with the help of the ebb. The gunners have not gone forward after breakfast; but presently there is some stir and muttering in the bows, and the word is passed aft of "Rohis," that is flamingoes. Sure enough the field glass shows a flock of large, white birds swimming in deep water nearly a mile ahead, and the boat goes about twice to get a good weather-gauge of them—always necessary in sailing to birds. We get out a rifle, for it is likely enough that they will not allow us within small-shot range, and at about eighty yards they close together and rise in a cloud, but one falls to the double shot, and is presently aboard and being admired as he deserves. Not only is he strange in shape and beautiful in colour, but a very good bird for the table, being, it must be remembered, simply a great outlandish goose.

We have now a head wind and but little left of the ebb tide that has favoured us so far. The canvas dinghy is folded up and hauled aboard and oars got out to windward, and although the next islet shows us a group of oyster catchers on its rocky beach, and a family of otters are diving and playing at the edge of the mangrove swamp, the guns are covered and stowed away. As we round the next point leaving the lake behind there comes into sight ahead a great black mass of towers and walls standing sheer out of the creek and beyond it a water horizon, and we run up our tiny flag. It is ten to one if the fortmen can see its colours at all; but our sail is of a cut unusual in these waters, and presently there is a movement visible on one of the towers, a great flag rises slowly on its halyards, and a puff of smoke hides tower and flag for a moment, to be followed by another and another, until we have got our proper greeting.

It is a voice out of the past, for the guns that spoke it bear the initials and crown of C. R. S., that is Carolus Rex Succiæ, and the date 1665 ; and the fortress itself is the island of Janjira, and we are here in touch with the 17th century. But if I were to tell you of all the other things that are to be seen here and hereabouts, we should, I think, be in touch with the 20th before the end of the chapter; so for the present I must stop.

OUR HYMENOPTERA.

By Robert C. Wroughton.

The principal object of this paper is to try to awaken an interest in a group of insects, mostly small and with little in their appearance to catch the eye ; but regarding which nevertheless it is the simple truth to say that of the living inhabitants of this earth they rank next to ourselves in point of intelligence. The wonderful instincts of the Honey Bee are common property, and we all know that some kinds of ants keep slaves, while others herd cows; but many points in the habits of even the common house ants are mysteries still, and of the ways of the countless Wasps, Ichneumons, Mason Bees, Leaf-cutters, and others of the tribe which swarm about our houses, and build their mud huts on the walls, or take possession of key-holes, and rear their families under our very eyes, we know absolutely nothing at all. It is not that you and I know nothing: nobody does. About the great majority of these insects nothing has ever been recorded. It would be a lasting glory to this Society if we could give the world some account of the habits and life-history of our local species, and it would be a lasting source of delight to every individual member to get once for all thoroughly interested in such a subject ; but at the outset there is a difficulty which deters us all, a barrier which few have the means or the leisure to surmount. It is this, that if we make a collection, we cannot name our specimens, and if we make observations, we cannot record our facts without names. The classification of the Indian *Hymenoptera* is a pathless waste, without a book to light us through it, or a museum to which we can go for guidance. In these circumstances there is only one thing to be done. We must get together a collection of our own, arranged and named, to which each private collector may go to compare and name his specimens, with this object I have been working for some years, and with the help of friends have gathered together about 500 species, which are roughly classified and a few of them named. Alarge number have been sent to England and will soon return, I hope, with their baptismal certificates : the rest are in a cabinet in this room. What I ask for now is help—help in collecting specimens and help in collecting facts. Specimens may be pinned, and kept in corked boxes, like butterflies, or popped into spirits, or put into a small bottle with dry sawdust (which typifies the classification). Facts to be of any value, must be accompanied by the insect to which they refer. What I should like most is to see many of our members making collections for themselves, and I need not say how glad I should be to give them any help in my power. One department of the subject which I specially commend to lady members is the keeping and rearing of ants. Ant houses are easily made, and Sir John Lubbock's well known book will give many hints on the management of these pets.

I will now ask your attention to a very sketchy account of the classification of the order of insects called *Hymenoptera*, which may serve as pegs on which to hang a few notes about each principal group. I am afraid you will find the subject dry : I cannot make it otherwise ; but even the pegs on which we hang our clothes are dry.

Insects, or the 'insecta,' as now recognised, are distinguished by having in the perfect state only 2 antennæ, only 6 legs, and the body divided into 3 parts, *viz*., head, thorax and abdomen.

As a rule the life history of an insect comprises four stages, *viz*., 1st the egg, 2nd the larva, 3rd the pupa, 4th the imago. These stages are sometimes very sharply distinct as in the butterflies, sometimes indistinct, though traceable, as in the Grasshoppers, while sometimes they are completely lost as in the mysterious parthenogenesis of the Aphidæ. As a rule insects in the imago stage are winged, but there are many exceptions to the rule of which the workers among the ants and the domestic flea are familiar examples, the latter too familiar. More than a century ago Linnæus basing his classification mainly on the character of the wings, divided the insecta into 7 orders, *viz*.:—

1. *Coleoptera*, or sheath-winged, *i. e.*, Beetles.
2. *Neuroptera,* or nerve-winged, *i. e.*, Dragon flies, white ants, &c.

3. *Hymenoptera,* or parchment-winged, *i. e.,* Bees, wasps, ants, &c.
4. *Lepidoptera,* or scaly-winged , *i. e.,* Butterflies and moths.
5. *Hemiptera,* or half-winged, *i. e.,* Bugs, aphidæ, &c.
6. *Diptera,* or two-winged, *i. e.,* Flies.
7. *Aptera,* or no-winged, *i. e.,* Fleas.

Though many changes and additions have since been proposed at various times, yet the generally accepted classification now is the same, in nomenclature at least, as that of Linnæus, except that the *Aptera* have been absorbed into the *Diptera,* and a new order, *Orthoptera,* or straight-winged, has been added, immediatley following the *Coleoptera,* to contain the grasshoppers, locusts, crickets, cockroaches, *Mantidæ, Phasmidæ,* &c., which Linnæus included, along with the bugs, in his *Hemiptera.*

Kirby estimates that out of 222,000 species of insects known as inhabiting the world, the *Hymenoptera* comprise 31,000, ranking third on the list after *Coleoptera* with 97,000 and *Lepidoptera* with 45,000.

The chief distinguishing characters of the *Hymenoptera* are :—

1. Four apparently naked wings, with few veins (hence the name from ύμην= parchment).
2. Mouth furnished with both mandibles and a proboscis.
3. Female furnished with an ovipositor often modified into a sting.
4. *Larvæ* usually footless, pupæ inactive.

The *Hymenoptera* are primarily divided into two sub-orders, *viz.* :—

Terebrantia, in which the female is armed with an ovipositor.

Aculeata, in which the ovipositor is modified into a sting.

The *Terebrantia* are again sub-divided into two groups, *viz* :—

Phytophaga, or vegetable eaters.

Entomophaga, or insect eaters.

The word " eaters," however, does not refer to the imago or perfect insect, but to the larva or grub form.

We may dismiss briefly the *Terebrantia phytophaga,* which comprise only two families, the *Tenthridinidæ* and *Siricidæ.* In the former the larvæ feed exposed on the leaves of trees like the caterpillars of butterflies, while in the latter they bore in the wood. We have no specimens of either in our collection. The *Siricidæ* are chiefly confined to Pine forests, so we may well have none in Bombay, but as regards the *Tenthridinidæ,* though none have been found, it does not follow that there are none.

The first family of the *Terebrantia entomophaga* is the *Cynipidæ.* They are for the most part microscopic insects, and the very large majority of those described are gall producers. " Apples of Sodom" and " Robin's pincushion " at home are the work of cynips, while the ink gall of commerce is the handiwork of an exotic species. No one has worked the Bombay, or indeed to any extent the Indian *Cynipidæ,* so that for any of our members with leisure and a turn for microscopic research there is a grand field. It is a most interesting family, many of the species being dimorphous, and their reproduction nearly, if not quite, as complex as that of the *Aphidæ.*

The galls of the *Cynipidæ* are said to be often much infested by insects of the next family, *viz.,* the *Chalcididæ.* We have specimens of a few species, but as in the *Cynipidæ,* very many are extremely minute. Of the specimens in the Society's collection, No.1 (*Leucospis atra*) was bred from pupæ of the commom Bombay butterfly, *Delias eucharis.* Another is parasitic on a small Mason Bee, which may be found during the rains in the Dekhan busy constructing its nest in the holes and cracks of every wall, and lately I have reared a large species from the nest of a wasp (*R. litidulum*).

The next family, the *Ichneumonidæ,* is a very large one, no less than 1,200 species having been described by one European writer. A very large proportion are probably parasitic on the larvæ of various *Lepidoptera,* but no observations as to the life history of Indian species have been recorded : indeed few, if any, seem to have been named. At any rate some of the commonest in the Society's collection when sent home to the British Museum were said to be undescribed.

The *Braconidæ* are a small family which has lately been separated from the last, the differential character being chiefly the comparative length of the various antennal joints, and the soldering together of the 2nd and 3rd fragments of the abdomen in the *Braconidæ.* Some of the *Braconidæ* are very minute, and are parasitic on the *Aphidæ.*

The *Evaniidæ,* or at any rate the commoner species of the family, are parasitic on the cockroach. *E. lævigate* in our collection is a very common Bombay insect, haunting our bathrooms, and a most extraordinary looking insect it is; the abdomen is very small and attached by a pedicle, or stalk, apparently to the nape of the neck.

The last family of the *Terebrantia* is the *Chrysididæ.* By some it has been proposed to form it into a distinct group under the name of *Tubuliferæ*, but this view has not been generally accepted. The *Chrysididæ* are known as Ruby-tailed Flies, Emerald Wasps, &c. Some of the European species are a lovely rose or flame colour. We have a great number of specimens in our collection, but their classification, even into genera, is very obscure. The *Chrysididæ* are all parasitic, ordinarily on other hymenoptera, the solitary Mason Wasps being specially victimized. In order to provide for their young they resort to "lurking-house trespass." The ichneumons by means of their ovipositors pierce the skin of the victimized larvæ in whose body the eggs are laid and on whom the ichneumon larvæ, when hatched, prey. The *Chrysididæ* act quite differently. The female hunts about until she finds, say, a wasp building its mud nest, and there she sits down to wait. I have watched the manœuvres of a chrysis during nearly an hour. Each time the wasp quitted the nest to seek more building material, chrysis advancad rapidly to take stock of progress made, retiring each time to her lurking place about six inches off. At last the wasp had completed her nest and put the finishing touches, and started off to search for the larvæ with which it was to be provisioned. This time chrysis, after entering and surveying the nest, came out, but instead of returning to her lurking place, she backed into the newly-made nest, and no doubt, laid her egg after which she came out and flew away. When a chrysis has thus laid her egg in a newly-finished nest, it is unsuspiciously provisioned by the builder who also lays her eggs therein. The larva of chrysis, however, hatches first and consumes all the provision, and the rightful occupant thus dies of starvation, and the cell which should have produced a wasp produces a chrysis.

The second sub-order, *viz.*, the *Aculeata* (or Stingers) is divided into four groups or main divisions, *viz.*:—

1. *Heterogyna* containing the ants.
2. *Fossores* (Diggers), containing all the rest, except
3. *Diploptera, i. e.*, the Wasps.
4. *Anthophila, i. e.*, the Bees.

The *Heterogyna* comprise only the *Formicidæ* or ants, and are divided into the following three families :—

1. *Formicinæ*, which are ants proper and have no sting, but many of which bite severely, as, for example, the common red, *Æcophila smaragdina*, who sews up mango leaves for a habitation, and seems to be able intuitively to select for attack the softest part of any person invading his haunts. The common big black ant of

our bungalows (*Camponotus ardeus*) (with his country cousins *sylvaticus* and *callidus*), as well as his deadly enemy the small black ant, whose name I do not know, but who seems to spring in hundreds from nowhere when sugar has been left about, are all *Formicinæ*. To which, also belong the ants which at Mabaleshwar, Matheran, &c., trace out white paths on the ground.

2. *Ponerinæ*, which like the *Formicinæ*, have only one node, or knot, on the abdominal stalk, but they sting most severely. There do not seem to be very many species of *Ponerinæ*. The common species is a large insect living under stones in comparatively small communities. Its sting is quite as severe as that of a bee.

3. *Myrmecinæ*, which are very numerous. They have two nodes on the abdominal stalk. To the *Myrmecinæ* belong all the various kinds which harvest grass seed; also the ant which, living under ground, raises concentric mud rings round the mouth of its nest. In another species of the *Myrmecinæ*, common enough in the Konkan, the workers are very minute, but the queen is a comparatively gigantic insect, being ¾ in. long. This species has at least two classes of "soldiers" of different sizes, the smallest of which would make half a dozen of the minute workers. As far as I have been able to discover, this species is stone-blind; in fact, as far as the worker is concerned, has no eyes.

I have seen a column of these ants in course of migration. A number of workers went ahead and built a covered way or tunnel in which the main body travelled, dragging with them dead earthworms, beetles, &c. It was curious to notice that in this commissariat-transport work a willing hand was lent by the smaller-sized soldiers. When, however, I broke down the tunnel, a halt was called, and parties of workers set to work to repair the damage, but as this manual labour, though fussing about a great deal, the soldiers were too proud to assist. The larger soldiers were evidently purely fighters, for they did not help even in the transport of provisions. I believe this ant to be a species of the genus *Pheidolor*.

There is another insect very common in Bombay, and which in its female or queen form swarms about the lamps at certain seasons. It is a palish brown ant, with a large unwieldy body. It belongs to the *Dorylidæ*, as to whose place among the *hymenoptera* there does not seem to be unanimity of opinion. While some place it as a distinct sub-division of the *Heterogyna*, some go to the other extreme and class it with the *Ponerinæ*.

It is not necessary to tell the members of this learned Society that the ants are social, living together in large communities. Each community consists of females or queens, males, and workers (which are undeveloped females). In some species there is a fourth class, *viz.*, the soldiers, which, like the workers, are modified females. The female ants have got the name of queens, I imagine, from the analogy of the bees. In an ants' nest, however, there are a number of queens, and from the researches of Sir J. Lubbock and others, it appears that ants have not acquired the art of "manufacturing" queens at pleasure, as the bees are known to do. An ant community consists principally of workers with, in some species, a proportion of soldiers. Certainly in some species, and probably in all, however, there are seasons of the year when there are queens, while, as far as I know, in all species the males are found in the nest only just before the nuptial flight, from which they do not return. The queens and males are at first winged, but at the conclusion of the nuptial flight the queens lose their wings. I have seen it stated that the queen having lost her wings wanders about until she is found by workers of her species, who take charge of her and commence the building up of a new community. It may be so with some species, but Sir. J. Lubbock's experiments give little support to this theory, and I have more than once found a queen of *Camponotus callidus* unattended by workers and brooding over a small number of pupæ, no doubt the product of eggs laid by her and the germ of a new community.

We commence the next group of the *Aculeata* with the *Mutillidæ.* They are often called "solitary ants," from supposed resemblance in the shape of the female to a huge ant. The female mutilla is wingless, ordinarily covered with down, and usually gorgeously coloured with rings and spots of gold, silver, or crimson on a brown or black ground. The male on the other hand is usually dull coloured, and is winged. A very great number of species have been described and named, but in a very great majority of cases only the male or the female of each species is known, and there is no doubt that with further investigation nearly half these species must be merged in the other half. Very little seems to be known of the life history of mutilla. The general opinion seems to be that the female makes burrows in sandy soil, provisioning her nest with flies. I feel certain and hope shortly to have convincing proof that some at least of our *Mutillidæ* are parasitic, not by means of lurking house-trespass, like the *Chrysididæ*, but by burglary on the mud nests of other *hymenoptera*.

The next family, the *Scoliidæ*, is represented by specimens of a good many species in our collection, but my attempts to investigate their life history have all failed. The closely allied *Thymidæ* are almost exclusively American.

The *Bembecidæ* comprise very few species. At first sight they may be mistaken for wasps, which they much resemble in their colouring, the illusion being increased by the fact that they are gregarious. They are not however social. Each female digs her own burrow, and a very pretty sight it is. She works exactly like a terrier dog, loosening the soil with her fore feet and mandibles, dragging it backwards to the entry, and then kicking it out with her hind legs in showers to a distance of some inches. The commonest of our *Bembecidæ*, *B. sulphurescens*, stores her nest with *Diptera*, and probably others do the same. I have never seen the capture of the prey by *Bembex*, but as her flight is most powerful it cannot be a very difficut task.

The *Pompilidæ* comprise a good many species, but their habits are not well known. I have seen the smaller ones carrying spiders, dragging them backwards, but have no idea what the larger kinds employ to provision their nests. Some of the species of *Mygnimia* are the largest among the *Hymenopteræ*.

In the family of the *Sphegidæ* are included genera of widely divergent shapes. *Pelopæus*, commonly known as the Sand Wasp, is a very common form. Two species (*Bengalensis*, dark blue, and *Madraspatanus*, banded black and yellow,) are familiar to every Indian resident. They build mud cells in all sorts of odd positions in our rooms, which they ordinarily stock with spiders, though sometimes with caterpillars. *Madraspatanus* takes great precautions against parasites, closing the entry to her completed cell with a mud disc made for the purpose, but shows want of intelligence in not using the disc a second time. Several discarded discs may always be found below her nest. I speak from a man's point of view: possibly she could give a satisfactory explanation of her proceedings, and unfortunately we cannot get her opinion of the operations of our P. W. D. It is noteworthy that I have never succeded in breeding *chrysis* from a nest of *Pelopæus*, and I thought that they were proof against all but microscopic parasites (? *Chalcididæ*) until quite lately I caught a species of mutilla on a nest of *Pelo-*

pæus, and on removing the nest found each cell had been broken into, by mutilla no doubt, in order to lay her eggs, for about the same time from a nest of *Pelopæus* received from Madras I reared a mutilla of a closely allied species. *Ammophila* may often be seen carrying large green caterpillars, twice her own size, and *Chlorion* huge crickets. All the *Sphegidæ* bury the insects alive in their nests, having first paralysed them by stinging them, and in this way provide a supply of fresh meat for their offspring. Some stress has been laid on the high development of instinct involed in the practice, for it is stated that to be effectual the sting must penetrate a nerve centre. I confess I should like more evidence to show that a sting in any part of the body would not be equally effectual.

The remaining families of the *Fossores, viz., Larridæ, Nyssonidæ, Crabronidæ,* and *Philanthidæ,* contain mostly small insects. Some of them make their own burrows, while some I believe utilize any suitable hole or cervice. Very little or nothing however is recorded of our Indian species. Flies, gnats, aphides are recorded as stored by English species, and some of the larger *Philanthidæ* are said to destroy great numbers of bees.

The next group of the *Aculeatæ* is the *Diploptera* or Wasps, the most striking character of which, as shown by the name, is the longitudinal folding of the wings in repose. A very large proportion of the solitary wasps are included in the family of the *Eumenidæ*. The genus *Eumenes* seems to me to be more persecuted by parasites than any other of the Hymenoptera. In the local vernacular they are known as "Kumbharin," from their habit of building mud nests. These they store with caterpillars, as far as I know always green, and always of the *Geomitridæ,* commonly known as "stick caterpillars." *Eumenes* seems to be rather muddle-headed in her architecture. She usually commences by building a shapely enough cell, like the common native earthen pot, but usually proceeds to surround this with others sloping at all angles, and if not disturbed, renders the whole building as shapeless as possible by an irregular layer of mud put on at random. The idea of thus assimilating her nest to a handful of mud thrown against a wall is a good one, but to an ordinary mortal it would seem simpler to build roughly and irregularly from the first. When the nest is built on a white background it is almost invariably ornamented (?), as a finishing touch, with streaks of chunam. Is this meant to make the mud ball less visible? If so, why not completely whitewash it? Are these precautionary measures adopted against mortals or against insect parasites? It is a curious fact that nests built on glass are always streaked with white, hence glass is apparently white to the eyes of *Eumenes.* I have said that *Eumenes* is much parasited. Here is a by no means abnormal instance. I took a nest of eleven cells. Three cells yielded each a beetle, three yielded each a chrysis, two yielded each a swarm of flies and three only yielded *Eumenes*. The beetle I mentioned above has been identified for me by the authorities of the Indian Museum at Calcutta as belonging to the *Mordellidæ* and as allied to a European species which is a parasite on one of the European *Diploptera.* Whence this race antagonism? Another genus of *Eumenidæ* is *Rhynchium,* of which a brown species is very common about our rooms and makes mud cells, not building like *Eumenes,* but adapting holes and crevices of wood work, &c. A black species, *Nitidulum,* frequents our verandahs and builds her nest like *Eumenes.* The cells remind one of the old nursery pictures of Ali Baba's oil jars, and are built in clusters of 20 or 30 or more, the material is mud, and the whole is covered with a dark-coloured sticky varnish, possibly intended to keep off parasites. If so it is a failure. The Social Wasps, or *Vespidæ,* are represented chiefly by three genera, *viz.*, *Icaria, Polistes* and *Vespa.* *Icaria* best represents what we naturally picture to ourselves as a "wasp," except that they have not the striped look of our English *vespa.* There are a good many species which all build ' brown paper" nests. Usually these are of small sizes and are supported on a stalk, but one species arranges the cells so as to form a long tapering nest a foot and more in length. The principal representatives of *Polistes* is *Hebræus,* which is not unlike our English hornet in shape, and is pale yellow with black stripes. *Hebræus* lives in immense communities, and when in possession of a bungalow rapidly becomes a nuisance. Of *Vespa* we have two forms, *viz.*, the common, *Vespa cinta,* and *Vespa indica,* who gradually takes his place as we move north to the Punjab. *Cincta* is the big dark brown wasp with a bread yellow band, which may be seen in numbers about sweetmeat-sellers' shops. *Cincta* is said to loot the pupæ from the nest of other *Vespidæ,* but I confess in my mind he is always connected with a tray of "dudhpendis," "jelebis,," &c., in the hands of a very dirty retail sweetmeat-seller. Among tho *Vespidæ* as with the ants there are three orders or estates, the queens, the males and the workers, but among the *Vespidæ* all classes are winged.

I feel that I can drop the apologetic tone at length when I ask your attention to the last group of the *Aculeata*, *viz.*, the *Anthophila* or Bees. The *Andrenidæ* are solitary species of small size and dull colouring. Many of them nest in crevices of walls, but some burrow in the ground. Unless looked for most of the species are likely to pass unnoticed. The *Apidæ*, in addition to the social honey bees of the genus *Apis*, contain a number of solitary genera. *Megachile* comprises a great number of species, some of which are very common. *M. lanata* may be heard humming about the room at almost any time of the year. She builds a tube of mud, which is divided off into cells, each containing an egg and a supply of "bread." This tubular nest is put in the most extraordinary places, inside a boot left unworn for a couple of days, among clothes exposed on a shelf, in a gun barrel, in a shell, between books on shelf, &c., &c. Some of the *Megachile* line their mud tubes with a membrane evolved out of themselves, but many use cuttings of leaves which are made neatly into cigarettes, and fitted into burrows in the ground. Though solitary, *Megachile* is said to be sometimes gregarious. Be that as it may, *Xylocapa*, the Carpenter Bee, is almost always gregarious. The large holes so often seen in old dead trees, looking as if bored with an augur, are the work of *Xylocapa*. Though a hundred and more species have been made in this genus, to the ordinary observer the greater number are indistinguishable. A large blue-black Bumble-bee, making a very loud buzzing in its flight, is a description which will cover very many species. There are however brown species which are crepuscular if not nocturnal. *Cœlioxys*, another genus, is said to be parasitic in the nests of *Xylocapa*. It has been bred from nests of *Xylocapa*, but that it is parasitic seems to me to need furthur proof. Finally, of the *Apidæ* with which the classfication of our Hymenoptera closes, we have three common species, *viz.*, *Floralis*, the maker of what is known as "fly honey," is the smallest. *Nigro-cincta*, much larger in size, is common in our gardens, and in places is said to have been successfully domesticated, while the giant *Indica* is for the most part an inhabitant of the jungles. Building huge combs on big trees, or on the face of precipices, this bee constitutes himself the Raja of the whole region. Woe to him who disturbs *Apis Indica* by daylight. He will be lucky if he escapes with his life. Like the wasps, the Social Bees have winged workers, but unlike the wasps and ants, they are said to have only one queen, and to be able in case of need to evolve a queen from a larva, which in the ordinary course, would have produced a worker by special feeding and education.

I hope I have given you some idea of the variety of curious points on which information is wanted. I will refrain from quoting a familiar hymn to which my subject might have tempted me; but I will apply the moral of the honey bee so far as to point out that if each member of this Society would contribute something, just an interesting fact which had come under his own notice, a specimen or a nest which he had found in his house, we should soon have a respectable store of information on the manners and customs of this most interesting order of insects.

AN ADDRESS TO STUDENTS OF BOTANY IN WESTERN INDIA.

By A. K. Nairne.

It may be assumed that in our days many of the young English men and English women who go out to India would like to know something about the floral beauties which meet their eyes wherever they turn. Many of them have known all the common flowers of the woods and the roadsides at home, and have very likely learnt enough of the elements of Botany to know the orders to which the commonest or the most beautiful belong. And it seems unnatural to them to be set down in a country full of beautiful flowers and to get no knowledge of them. In the same way there must be many intelligent young natives, whose education has taught them that every plant has its name and its place in classification, and who would therefore like to learn a little practically about Botany and its treasures. Now (at home the number of small books intended to help beginners in the study of Botany is very great; the number of those which give lists of all the wild plants in England, more or less scientific, but all simple, is very considerable, so that it is very easy for any Englishman to get up the Flora of his native land, if only he chooses to give the time to it. But it is very different in India. None of these small books of Botany have yet appeared here. The enquirer may, indeed, find the names, both native and scientific, of the *trees* of any district he may be in, in of one or other volume of the *Bombay Gazetteer,* but he knows not where to turn for information as to the many beautiful shrubs, creepers and herbs, which in most Indian districts call forth constant admiration, and are many times more numerous than the trees. A list of the botanical books available for Western India will show how very badly off the unscientific or half-scientific enquirer is. There are two books relating exclusively to the Bombay Presidency, one of which, Dalzell and Gibson's, aspires to be a Flora. But five minutes' examination of this has been sufficient for very many men, who would not be afraid of studying something even much deeper, if there were any chance of mastering it. But the first thing that makes itself manifest with regard to Dalzell's book is that it requires half-a-dozen other books to make it intelligible. There is not a word of explanation as to the plan of the book, no description of orders, and, what is worse, no description of genera. And the genera were (as was probably inevitable), taken from one author or another just as it happened. The book is, in fact, a collection of specific descriptions of plants, arranged according to the natural orders certainly, but with (apparently) no other system running through it. The language of the descriptions is unnecessarily difficult, the native names of plants are given very rarely, and some of the commonest trees in the country are not named at all except by their Latin botanical denomination. The other local work is Graham's "Plants of Bombay," a mere sketch unfortunately, though easily recognizable as the work of a great master. But judging by the difficulty of getting this work ten or fifteen years ago, I should fear that by this time it is almost unattainable.* When we turn to the Botany of India generally, we naturally begin with Hooker's Indian Flora. And, indeed, there is no other single work from which we could hope to get information as to all, or nearly all, the plants to be found in Western India. But apart from the fact that the work will probably not be completed for some years, its very great range renders it almost useless for any but a professional botanist. Page after page is taken up with descriptions of plants found only in the Himalayas, or Ceylon, or Java, or the Straits, so that those which belong to what we may call India proper, are in a way crowded out. But this is not the only objection. The great expense of the work is a fatal one as regards ordinary students. Then also as to the grouping of orders. Many will have noticed that the old division of exogens into *Thalamifloræ*, *Calycifloræ* and *Corollifloræ* does not appear, and where one is always wanting more light to take away even a little of what there was before is a distinct hardship. But the absence of these divisions does not mean that they have been abandoned, but that they are assumed to be known, for I was told at Kew that the Indian Flora, like all others prepared there, is based on Bentham and Hooker's "Genera Plantarum," and in this not only are these three great divisions of orders given, but a fourth is introduced, *Disciflorœ,* and the orders are also arranged in groups subordinate to those great divisions. Added to this the similarities and differences of each order from its immediate neighbours is there given, and this every one will acknowledge to be most valuable. But the "Genera Plantarum" is quite out of the reach of the ordinary botanical students, for, besides being a large and very expensive work, it is written in Latin.[*] Thus there is practically nothing systematic as to India generally which the unscientific botanist can turn to to help him in identifying the plants of the Bombay Presidency. I ought perhaps to mention Professor Oliver's little book ("First Book of Indian Botany") which is intended to teach the beginner the orders common in India, and which might therefore, to some extent, make up for the deficiencies of Dalzell and Gibson. But I never found it of much use, the descriptions, I think, are too difficult, the examples given far too few; it is, in fact, too much the work of a professional botanist, and it smells of the Herbarium rather than of the open contry. If it had gone entirely on the lines of Lindley's "School Botany" (for England), an old and valued friend, I suppose, of many besides myself, it would have been most useful, and would have given any young student a good start; but it is quite different.

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* The author seems to be unaware of the publication, in 1886, of the 25th volume of the *Bombay Gazetteer*, containing—"Useful Plants of the Bombay Presidency," by T. C. Lisboa; "Botany of the Bombay Presidency," by Surgeon-Major W. Gray, L.M.L.Ch.; "List of Gujarat Trees" from Materials supplied by G.H.D. Wilson, Esq., G. C. S., and Lieut.-Colonel T. G. McRae, which articles to a great extent, though not fully, supply the want the author complains of. The Hon. Mr. Justice Birdwood's "List of Plants of Matheran and Mahableshwar," published in this Journal, also affords great assistance to students of Botany for these particular localities.—G. C.

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[*] I feel bound to add, to prevent any one taking trouble to get the information, that neither the division *Disciflorœ*, nor the subordinate groupings of orders, will be found of any use to the ordinary student. For there are almost as many orders without conspicuous discs as with them in Discifloræ and some orders with conspicuous discs (*e. g.*, *Myrtaceæ*, *Umbelliferæ* and *Araliaceæ*,) are left in *Calycifloræ*. And the subordinate groupings of orders I found useless, because in the first place the definitions are full of alternatives, and in the second place the distinctions depend mainly on such obscure points as the number of cells in the ovary, position of the ovules, nature of the albumen, and so on.

I have not set down this list of difficulties merely for the sake of making a wail, or to induce young botanists to give up their hopes and their studies till better days come. But I lately came upon some thing which I thought might help some of those who are painfully struggling (as I did for many years) to identify the plants they meet with one of Dalzell and Gibson, with the help of other books, like the invaluable work of Roxburgh, which contains just a few Bombay plants. The work I mean is Rousseau's "Lettres Elementaires sur la Botanique." (Vol. 4 of Rousseau's Works, Lahure's edn., Paris, 1857.) He began by simply showing the difference between a monopetalous and a polypetalous corolla, and then chose six of the largest orders to explain and illustrate. He took, of course, those of the large orders which are most fully represented in France, three monopetelous and three polypetalous. They were (in his order) *Liliaceæ, Cruciferæ, Leguminosæ, Labiatæ, Umbelliferæ* and *Compositæ*. The fourth is what I shall have chiefly to speak about, so I will here only say that it was not the order *Labiatæ*, but a group; the name of 'Fleurs en gueule' being given by Rousseau to all flowers having a two-lipped corolla and didynamous stamens. Now, of the other orders described by Rousseau and mentioned above, Nos. 1, 2 and 5 are not sufficiently common in Western India to serve our purpose. *Leguminosæ* and *Compositæ* are, and it would be easy to take three other orders (or groups of orders) common here, and thus to describe generally within a very reasonable compass and in a simple classification a very considerable portion of all the plants of the Presidency. Rousseau's idea was that if the student learnt up these great orders to begin with, so as to know the species common in his own country, and to be able to recognise other species of the same orders when found elsewhere, this would give him such a start that he would have no difficulty in going on, and would little by little learn to distinguish most of the orders. It will be easily seen that such a system as this is quite opposed to the ordinary modes of teaching scientific botany, and may be objected to accordingly. But the answer to that is that the ordinary modes of teaching imply that the student will be able either to study the science in a systematic way more or less at his leisure, or else to have a good supply of scientific books to refer to. That this last condition cannot be fulfilled in

W. India I have shown; and as most of the students whom I am thinking of in writing this paper are scattered about the Presidency often in out-of-the-way districts, it is not at all likely that they will be able to supplement their scanty scientific education by attendance at lectures or resort to libraries. Now one of the chief reasons why botanical books are repulsive and botanical classification difficult, is from the chief distinctions of orders and genera being taken from the smaller parts of the organs of generation of the plants, and so almost always involving microscopical details. If plants could be classified by such prominent parts as the petals or the leaves, a great part of the difficulty to beginners would be avoided, and a great many barbarous looking words got rid of. I do not of course mean that this can be done; but the classification of Linnæus depending on the number and arrangement of the stamens and pistils, is far easier for beginners than what is called the natural system; but it has, unfortunately I think for people situated as those for whom I am writing are, been almost entirely abandoned.

I propose in this paper to work a little on Rousseau's lines with the view of helping students not far advanced in the identification of the common plants aroud them. I shall in this paper bring together all the orders containing flowers with bilabiate corolla: and didynamous stamens, showing where they agree and where they differ, and shall then describe, as shortly and simply as is possible for identification, a certain number of the commonest and most remarkable species found in W. India. I put it this way, because it is clear that plants attract the attention of ordinary observers either by being very common without reference to there being anything attractive in them, or by being very conspicuous, though they may not be common.

The following are the characteristics in very simple language of the whole group of plants of which I am writing. Corolla monopetalous, *i.e.*, all in one piece, the lower part (and generally the larger part) being a tube, whether broad or narrow, the edge of the flower (at the top of the tube), which vary very much in size, being variously cut, not symmetrically, but more or less into an upper and lower lip.* I should mention that Rousseau made a further distinction of labiate and personate corollas, the first term signifying (with him) those with the lips well separated as in the *Ocimums (tulsi)*; the second, those with the mouth closed, as in the English snapdragon *(Linaria)*. But I think it better not to make this a distinguishing mark, though, of course, this difference must be noticed.

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* Take as examples of a very narrow and a very broad tube the corolla of *Achimenes* and *Gloxinia*, respectively; and as examples of a very strongly and a very obscurely two-lipped corolla, that of *Salvia* and *Lantana*, respectively, remembering that between these extremes there are any number of variations.

The orders respresented in W. India, which have, partially or entirely, flowers of this sort, are the following:—

Scrophularineæ, *Orobanchaceæ*, *Gesneraceæ*, *Bignoniaceæ*, *Pedalineæ*, *Acanthaceæ*, *Verbenaceæ*, *Labiatæ*. When these orders are described, it will be seen that they all have special characteristics of their own though agreeing in the common characteristics already mentioned.

1. *Scrophularineæ* contains a large number of genera. All these known in W. India (except one shrub found only in Sind) are herbs, the greater part rather inconspicuous. The leaves are either opposite or alternate, the stems generally round, the fruit generally a many-seeded capsule.

2. *Orobanchaceæ* is a small order of leafless parasitic plants that can scarcely be mistaken for anything else. The whole plant is generally of a uniform hue, most often brown or purplish, the stem has a few scales on it which could scarcely be mistaken for leaves. There are only six species in W. India.

3. *Gesneraceæ* is also a very small order, the five species known in W. India being all rare. They are herbs or undershrubs with characteristics very similar to those of *Scrophularineæ*.

4. *Bignoniaceæ*. Trees, mostly large ones, and conspicuous generally by the large size of leaves, flowers, and fruit, the latter being pod-like. None of these trees can be called common, but all are remarkable. There are some well known climbing Bignonias in gardens.

5. *Pedalineæ*. A very small order of herbs, of which only two are found in W. India, both described below.

6. *Acanthaceæ*. Mostly shrubs, very many of them very strong smelling and viscid, like the well-known *Karvi*. The flowers in this very large order are most often crowded together in spikes or racemes, surrounded with very many bracts. The leaves are always opposite.

7. *Verbenaceæ*. Mostly trees or shrubs, the subordinate characteristics not very clearly defined.

8. *Labiatæ.* Aromatic herbs (rarely shrubs), with square stems, opposite leaves, and an ovary composed of four deeply-separated lobes, which can always be seen at the bottom of the calyx tube by pulling off the corolla. These develope into a fruit of four one-seeded nuts (very small) remaining at the bottom of the calyx tube. This peculiarity of ovary and fruit distinguishes the order from all others (except some genera of *Boragineæ,* which in other respects are quite different), and there is no order more easily recognised. To it belong all the mints, lavender, rosemary, sage, salvias, &c. Now of these orders what has been said above of Nos. 2, 3, and 5 will be sufficient for the beginner. As to the rest, if he finds a *tree* with this peculiar form of corolla and arrangement of stamens he will know that it belongs to order 4. If a *shrub* with flowers closed in with many large bracts it probably belongs to No. 6. Any other shrub probably to No. 7. If a square stemmed aromatic herb, with the peculiar ovary mentioned above, it certainly belongs to No. 8. Any other herb probably to No. 1, though each of the other orders, except No. 4, has some herbs. Thus the field for identification is very much narrowed.

It only remains to give a list of the common or very conspicuous species found in W. India belonging to these orders, and possessing the peculiar form of corolla and arangement of stamens we are concerned with; for it must be remembered that in the large orders here given there are a good many plants which have either a regular corolla or else five or two stamens, or in some cases four equal ones. With these we have no concern in the present arrangement, but in two genera of Acanthaceæ here given the upper lip is wanting.

[*Note.*—In these descriptions, D. signifies Dalzell and Gibson's Bombay Flora; H. Hooker's Indian Flora; Native names in Italics.]

Bilabiate flowers with didynamous stamens.

I.—ORDER SCROPHULARINEÆ.

1. *Linaria,*—Corolla with mouth quite closed, and a spur below the lower lip.

L. ramosissima,—A smooth delicate plant much branched and prostrate; flowers yellow, solitary, long-stalked; leaves triangular, more or less lobed. Deccan and elsewhere. Throughout India, H.

Any one would recognise this from its likeness to the English snapdragons, both of garden and hedge.

2. *Lindenbergia,*—Calyx bell-shaped; corolla with upper lip broad, lower 3-lobed.

L. urticæfolia,—A very downy plant, growing generally on walls; flowers yellow, solitary, or in pairs, the throat spotted; leaves small, ovate, serrate. Throughout India H.

3. *Stemodia,*—Clayx more divided than the last; corolla as in the last, but the throat nearly closed.

S. viscosa,—An erect, hairy, sticky, strong-smelling plant with square stems; flowers dark blue; leaves stem clasping, ovate or fiddle-shaped. Common in Deccan, Konkan and Guzerat, especially on rice fields in cold weather.

[*Note.*—In some respects this looks like one of the Labiatæ, but a glance at the ovary and fruit will show that it cannot belong to that order.]

4. *Torenia,*—Calyx tubular, winged or keeled; mouth of corolla dilated, lips far apart.

T. asiatica,—Plant with dark blue or violet flowers, the lips of different shades; leaves triangular, crenate. This is the plant often called "Belgaum Violet"—not common, I believe, except in gardens. There are two other species still less common and smaller.

5. *Vandellia,*—Very small herbs; upper lip of corolla broad; concave, lower 3-lobed, spreading; upper pair of stamens arched, and the anthers joining.

V. crustacea,—A diffuse smooth plant, with square stem; flowers light purple; leaves oval, coarsely crenated. Common, but inconspicuous. Throughout India H.

6. *Striga,*—Small rough herbs, usually with square stems; calyx much ribbed; corolla tube bent.

S. euphrasioides,—Flowers mostly axillary and solitary, sometimes spiked, white, with a superficial resemblance to the English Euphrasia (Eyebright); leaves linear, rather long; bracts lanceolate, longer than the calyx. Common. Throughout India, and sometimes growing two feet high. H. Another species, *S. orobanchoides,* very common in the S. Konkan, is parasitic on roots of other plants, and is of a reddish hue all over.

7. *Ramphicarpa,*—Corolla tube long and slender; lobes nearly equal; lips obscure; capsule beaked.

R. longiflora,—A small pretty plant, with pure white flowers, very large for the size of the plant, generally solitary; leaves divided into many linear or thread-like segments. Very common in S. Konkan, growing in grass, and apparently all over the Peninsula of India. H.

8. *Sopubia,*—Corolla short tubed, broad mouthed ; lobes much as in the last.

S. delphinifolia,—A handsome plant with pinnatifid leaves and filiform segments ; flowers axillary, solitary, or in pairs, large rose-coloured, the throat darker.

Konkan and Guzerat. Throughout the peninsula. H. He makes it grow as high as three or four feet. I have not seen it more than half that.

[*Note.*—In the two last the much divided leaves, very uncommon in these orders.]

II.—ORDER OROBANCHACEÆ.

1. *Æginetia,*—Calyx spathaceous, deeply split in front; corolla tube broad; lobes nearly equal and very small.

Æ. Indica,—Dull purple all over, like a tobacco pipe standing on end, the large curved flower forming the bowl. Konkan, Khandalla, &c. Throughout India. H.

2. *Orobanche,*—Flowers in spikes or racemes; upper lip of corolla erect ; flower 3-lobed.

O. Indica (*Phelipæa I.*, D.)—Dull purple or blue, growing on tobacco and mustard plants.

III.—ORDER GESNERACEÆ.

Gloxinias and Achimenes, in gardens.

IV.—ORDER BIGNONIACEÆ.

As these are all trees which can be easily recognised by their native names, it seems unnecessary to give descriptions of them here.

1. *Oroxylum Indicum* (*Calosanthes I.*, D.)—*Taitu.* Konkans and Ghauts. Throughout India. H.

2. *Dolichandrone falcata* (*Spathodea f.*, D.) *Netasing, Marsingi.* Guzerat, Konkan and S. M. Country.

3. *Heterophragma Roxburghii,* *Waras.* Common on the Ghats and elsewhere.

4. *Stereospermum chelonoides.* (*Heterophragma ch.*, D.)—*Pádel, pádri.* Ghauts and S. Konkan. Through moister India. H.

5. *S. xylocarpum* (*Bignonia x.*, D.)—*Kharsing, bersingi.* Ghauts, Konkans, &c.

6. *Millingtonia hortensis,*—Native of Burma, but planted about the roads in Poona. A grand tree.

V.—ORDER PEDALINEÆ.

1. *Pedálium,*—Capsule hard, spinous, indehiscent.

P. murex,—A low thick-stemmed succulent herb; flowers small, yellow, solitary; leaves oval, obtuse, sometimes slightly lobed; fruit ovoid, with 4 conical spines from the base. *Gokru.*

Sandy shores of Guzerat, Kattywar, and N. Konkan.

2. *Sesamum,*—Capsule without spines, 2 to 4-valved.

S. Indicum,—Erect, slightly hairy, flower very like foxglove, varying in colour from purple to rose and white, with an offensive smell; capsule oblong, erect. Commonly cultivated. "Til tilli, jinjali." ("Open Sesame"—Arabian Nights.)

3. *Martynia diandra,*—An American weed with large cordate glutinous leaves and handsome flowers, much like the last; is pretty well naturalized. *Vinchu ákara.*

VI.—ORDER ACANTHACEÆ.

1. *Thunbergia,*—Climbers;* calyx very small, covered by 2 bracts; lobes of corolla nearly equal; capsule round below, beaked above.

T. fragrans,—A pretty climber with rather large pure white flowers, and large ovate bracts; leaves oblong, acute, slightly lobed. The minute calyx has 12 teeth, which is an easy distinction. Konkans pretty common. *Eri-vel.*

T. grandiflora and *T. alata* are two garden species, the first one of the largest climbers, with very large and beautiful pale blue flowers; calyx a mere ring; the latter much smaller, has bright buff flowers, with a dark throat, often called "Black-eyed Susan."

2. *Hygrophila,*—Herbs; calyx segments narrow, one pair of stamens, sometimes imperfect or obsolete.

H. serpyllum (*Physichiluss.*, D.),—A small creeping plant, covered with stiff grey hairs; flowers rather large for the size of the plant, bright blue, the lower lip blistered and spotted with white; leaves nearly round. Konkans, &c. At Lanowlee, in the cold weather, the rice-fields are covered and coloured with this. *Rán-te-wan.*

H. spinosa (*Asteracantha longifolia,* D.),—A stout rough plant, with blue flowers, sessile, in whorls of lanceolate leaves and thorns. Lower lip of corolla with a yellow spot. Very common in swamps. Throughout India. H.

H. salicifolia is very like this, but smaller every way. Grows in the same situations.

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* Several species of erect shrubby growth are cultivated in gardens.—G. C.

3. *Ruellia,*—Herbs or undershrubs; bracts larger than the calyx; corolla lobes about equal; capsule solid below, bearing large thin seeds in the upper part.

R. prostrata (*Dipteracanthus dejectus, D.*)—Prostrate or straggling and climbing in hedges; flower solitary or nearly so, purple or blue bell-shaped; leaves long, petioled, ovate, often acute; bracts like the young leaves.

Very common in Guzerat and the Konkan. (Query, Deccan?)

4. *Strobilanthes,*—Shrubs or herbs; calyx deeply 5-cleft; corolla tube bulged out.

Note.—H. has no less than 146 species of this genus, and it is exceedingly difficult to make which our Bombay species ought to be. But I have very strong authority for identifying the only very well known species as

S. callosus,—which includes D.'s *S. Grahamianus*, the late shrub so common at Mahableshwar and known as *karvi,* very strong-smelling and viscid; flowers in large thick spikes, large and handsome, deep blue, hairy within.*

5. *Blepharis,*—Rough creeping or prostrate plants, with leaves in whorls and crowded bracts; corolla with short fleshy tube, upper lip wanting, lower 3-cleft.

B. asperrima,—Straggling along the ground with weak straw-coloured stem, every part covered with bristly hairs; flowers blue or white, sessile; bracts whitish with green veins; sepals four in two unequal pairs. Very common on the Ghats, less so in the Konkan. *Pahadiatgan.*

B. boerhavifolia,—Flowers white, pale blue or pink, with yellow spot on the lip; bracts edged with bristles; leaves in fours, lanceolate. Common in Guzerat and elsewhere.

6. *Acanthus,*—Sepals and corolla as in the last.

A. ilicifolius (*Dilivariai.*, D.),—Small, handsome, thorny shrub, with leaves like holly, prickly, and large bright blue flowers; corolla lip nearly entire; bracts small, ovate. *Nigur.* Very common in salt marshes; sometimes called Sea holly, but not to be confounded with the English plants of that name. (Eryngo.)

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* This is the early flowering showy species common on the Ghats flowering in October.

S. perfoliatus, with thin spikes glandular bristly narrow bracts, and dark blue or purplish flowers: flowering in January, and

S. ixiocephalus, with thick heads, broad bracts and dull white flowers, flowering in January, are both very common in the ravines at Khandalla. Both are very viscid and strong smelling.—G. C.

7. *Barleria,*—Shrubs or large herbs with showy flowers; sepals in opposite pairs, the outer pair much the largest; corolla lobes 5, often divided 4 and 1, two of the stamens often imperfect.

B. prionitis,—Shrubby and thorny; flowers spiked or whorled, rather large, buff, soon falling off; larger calyx segments ovate, spinous, pointed; bracts subulate; leaves narrow at both ends. *Kholeta.* Very common.

B. montana,—Large smooth plant; flowers large and beautiful, solitary, sessile rose-coloured, mauve or blue: smaller calyx segments and bracts very small, linear.

Bombay, Konkan, and Ghats. Not uncommon.

There are several other species, one with blue another with white flowers, both very large; but none are at all common but the two given above.

8. *Asystasia,*—Undershrubs; sepals narrow; corolla lobes five, about equal.

A. coromandelliana,—Erect or procumbent, much branched; flowers in long, loose, one-sided racemes, yellow, blue or pale purple; bracts linear; leaves ovate, acute. Common.

A. violacea,—All softly hairy, with large violet flowers, the lower lip dark purple and spotted, is very doubtfully distinct from the last. Dr. T. Cooke calls it very common at Matheran, less so at Mahableshwar.

9. *Lepidagathis,*—Calyx of two large and two or three small segments; corolla tube swelling in the middle; limp decidedly 2-lipped.

L. cristata,—Prostrate hairy leaves; calyx segments and bracts all bristle pointed; flowers in dense round heads near the root, pale, streaked darker.

Guzerat, Deccan, &c.

Note.—There are many common members of this order which have only two stamens, and are therefore not mentioned here.

VII.—Order Verbenaceæ.

1. *Lantana,*—Straggling shrubs; with small flowers in heads; calyx small, entire or slightly lobed; bracts large.

L. camara,—An American plant, now very common everywhere, straggling and climbing, with square prickly stems and pretty flowers in roundish heads, pink, orange or lilac, and of many shades in the same plant. The whole smells very strongly of black currants.

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[*] The pink and white varieties doubtless belong to an indigenous species.—*L. indica, Roxb.* (*L. alba D.*).—G. C.

2. *Lippia,*—Like the last, but fruit a capsule instead of a drupe.

L. nodiflora,—A small creeping plant, tough and hairy ; flowers in ovoid heads, very small, pale, arranged so closely as to look as if on a common receptacle (*Compositæ*) ; bracts many, overlapping. Common in grassy places. Abundant throughout India.

3. *Premna,*—Trees or shrubs ; flowers small, often polygamous. calyx cup-shaped, surrounding the drupe.

P. coriacea,—(*P. scandens,* D.)—A large strong smelling climber; flowers greenish white, in large panicles ; one of the lobes of the corolla much larger than the rest ; leaves very large, pointed, shining. *Chámbári, Dhansar.* Konkan and Ghats.

P. latifolia,—Is an erect shrub, with flowers and leaves very much like the last. Common near the sea, and called by the same name as the last.

4. *Gmelina,*—Flowers large ; corolla tube short ; calyx bell-shaped.

G. arborea,—A tree hairy in most parts ; flowers brown and yellow, in racemes ; lobes of corolla broad, roundish, curled back, the lower are much larger and protruding. *Shewan, Kumar, Gumbá.* Konkan. Less common in Deccan.

5. *Vitex,*—Flowers small ; calyx as in the last, but more or less enlarged in fruit ; corolla decidedly 2-lipped.

V. Negundo (*V. bicolor,* D.)—Tall shrub, leaves 3 or 5-foliate, grey, leaflets lanceolate, the underside with the branches white and downy ; flowers in terminal panicles, lilac or light blue. *Nirgund.*

I should call this the commonest shrub in the Konkan : very common also on the Ghats.

VIII.—ORDER LABIATÆ.

1. *Ocimum,*—Flowers in whorls of 6 to 10, racemed or spiked; calyx with upper tooth very large, running down into the pedicel ; corolla tube short, upper lip equally 4-lobed.

O. basilicum,—Erect, nearly smooth ; spikes long ; flowers white, pink, or purplish. *Sabza.* "Sweet basil." Commonly cultivated

O. sanctum,—Softly hairy, the whole plant often purplish ; corolla very small, pale purple, hardly longer than the calyx. *Kála tulsi.*

Ram tulsi is *O. gratissimum.*

2. *Lavandula,*—Leaves much divided;* flowers in spikes; upper lip of corolla bifid, lower trifid.

L. Burmanni,—A tall plant; leaves bi-pinnatifid; segments linear; flowers dark blue or white, in dense spikes. *Gorea.* Common in the Deccan.

L. Gibsoni (*L. Perottetii,* D.) is like this but more hairy, and the leaves pinnatifid. It is found only in the hills above Sattara, and one or two similar places. Both these are so like the English garden lavender, both in appearance and smell, as to be at once identified.†

3. *Pogostemon,*—Flowers very small, many together in whorls, spiked; corolla lobes 4, lower usually the largest; filaments bearded and exserted.

P. parviflorus,—Strong, coarse, half-shrubby plant, mostly smooth, with purple stem and branches; flowers whitish, in close pyramidal heads. Has a strong smell of black currants. *Pangli.* S. Konkan. Very common. There are several species so much alike as to be not easily identified. *Pach,* commonly cultivated, is *P. patchouli.*

4. *Dysophylla,*—Small plants with generally whorled leaves; flowers dense, in spikes; corolla equally 4-lobed.

D. stellata,—Slightly hairy; leaves linear, 5 to 7 in a whorl; flowers red or purple. *Marvá.*

S. Konkan, Belgaum, &c. Very abundant on rice fields in the cold weather.

H. gives eight species of these, but there is a great similarity between them all. One, *D. myosuroides,* found at Mahableshwar, *Shewal,* has the leaves not whorled.

5. *Colebrookia,*—A densely woolly shrub; corolla lobes 4; about equal.

C. oppositifolia,—Leaves in threes, elliptic, narrow at both ends; flowers minute, dirty white, in very small dense spikes, suggestive of Indian squirrels' tails. *Báhmani, dasai, dasari, kajhar.* Very common on the Ghauts and Konkan hills.

6. *Anisomeles,*—Tall, coarse herbs; upper lip of corolla erect, entire, lower broad, spreading.

A. Heyneana,—More or less hairy all over, stem and branches acutely 4-angled; leaves ovate, crenate; flowers of no beauty, white or greenish, partly tinged with pink, in one-sided cymes. Very common in Salsette and the Konkan generally. *Chaudhára.*

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* In Indian species.—G. C.

† The leaves, however, are very different.—G. C.

A. ovata,—A large handsome plant, with soft-downy leaves, ovate, crenate; flowers in dense whorls, spiked light with deep purple lower lip.

Common in Guzerat, Deccan and Konkan.

7. *Leucas,*—Generally hairy or woolly plants of no beauty; flowers white; upper lip of corolla erect, hooded, lower spreading, with very large middle lobe; calyx with 6 to 10 teeth.

L. stelligera,—A tall plant with flowers in large dense whorls; calyx with 10 soft and spreading teeth. Ghaut, Konkan, &c. Very common at Matheran. *Burumbi, Guma.*

L. aspera,—About 6 inches high, rough and hairy; whorls of flowers small and dense; calyx curved, with oblique mouth and short teeth. *Tumba.*

Common on the seashore, plains of India. H.

L. linifolia,—Very like the last, but larger and nearly smooth; leaves linear or oblong.

This is the common species of cultivated fields in Guzerat, Deccan and Konkan.

There are several other species less common, one only.

L. biflora,—With flowers not dense. The genus is very easily known.

8. *Leonotis,*—Flowers in dense axillary and whorls, with many slender bracts; upper lip of corolla long hooded, lower very small, spreading, concave; calyx 8 to 10 toothed.

L. nepetifolia,—A strong annual 6 to 8 feet high; flowers orange coloured, hairy; calyx teeth bristly; leaves ovate, crenate. *Matisul, ekrî.* A doubtful native, but tolerably common and very conspicuous.

In conclusion, I ought perhaps to say that I assume that any one wishing to identify a plant by the aid of these notes will first set to work to make out the order to which it belongs, then the genus: will, in fact, work downwards from the greater divisions to the lesser. This method teaches one much more than merely running through all the species in the hope of hitting on the identification by some one or two marked features. And speaking more generally, I should say that I hold to the natural orders most faithfully, only wishing that other descriptive helps should be added to aid the student in what must always be to the beginner the very difficult work of identification. I should also add that those who are acquainted with the botany of the whole Presidency may very possibly think that the species chosen for description are not in all cases the commonest or most conspicuous. On this point opinions will no doubt vary, but it must be remembered that this is a mere sketch, and that I claim nothing but a very fallible degree of accuracy.

NOTES ON BIRDS OF QUETTA.

By A. T. H. Newnham, Bo. S.C., F.Z.S.

It is with some reluctance, seeing how little I have to say, that I have commenced to put to paper the few observations I was enabled to make during a short residence of three or four winter months in Quetta; but as it is by an accumulation of such scraps that we arrive at definite results, I shall endeavour to comply with the request of our Honorary Secretary to write something for our Journal.

This last winter in Afghanistan was comparatively a mild one, and in consequence the duck were somewhat late in putting in an appearance, so that it was not until the end of January that one heard of anything like decent bags being made. A wonderful shot was made by a sporting Colonel in the garrison, which, I think, deserves recording. He came suddenly upon a bunch of six duck round the bend of a stream, and firing as they rose brought down the whole lot. Presumably they must have all risen in one straight line with their heards in a row, but it was a singularly lucky shot.

Teal and gadwall are not unfrequently met with in the river beds, but the other species of duck seemed to keep more to tanks and larger sheets of water. I had sent to me no less than three specimens, all drakes, of that uncommon and beautiful little duck, the Smew (*Mergellus albellus*), and a very tedious job I found it skinning them, as they were mere balls of fat.

Sand Grouse were not so plentiful as they should have been, and were exceedingly shy: the commonest sort was the Imperial (*P. arenarius*). Of the Pin-tailed Sand Grouse (*P. alchata*) I only saw one flock, and that was quite close to the Fort. They were the first that I had ever seen, and I could not make them out at all at first, but took them for plover of some sort. They flew at a tremendous pace, faster even than the Imperial, and during their wheels in the air showed a clear white expanse of underwing. They were endeavouring to settle to feed, but were persistently bullied by the ravens, and obliged to move on. I was thus enabled to get a couple of good specimens as they came over me. I could not find out that the Sand Grouse up there had any fixed drinking place, as in Cutch and Sind: probably there was too much water about, and they drank wherever the fancy seized them.

I saw part of the skin of a Sand Grouse shot by a Warrant Officer of the Garrison, which, I think, must have belonged to *P. lichtensteinii*, which does not seem to have been recorded from S. Afghanistan before. A fair number of Woodcock (*S. rusticola*) were shot in or about Quetta this last winter. The first fell to my lot on November 11 (rather an early date for them), and the same day I saw two others. The exact number that were shot in the season I have no account of, but I should say between twenty or thirty. I heard of one man shooting as many as six in one day, but accounts of shikar must be received with caution. They invariably come in about the beginning of December, that is, the main body of them, and either move on or get exterminated; anyhow, they are not often seen after January. There were one or two favourite spots for them, but as often as not they were put up out of small gardens, and I even heard of one having been knocked over with a stone by a Tommy in the cemetery a year or two before.

There were three Solitary Snipe (*G. solitaria*) shot this last season, all in the Surkab, Pisheen, a broad strip of marsh and tamarisk bushes, between two ranges of hills. Unfortunately I could not succeed in getting hold of a skin for preserving before they had been plucked. In the same place was procured a single specimen of the English Water Rail (*R. aquaticus*), which I do not see recorded in Col. Swinhoe's list of the birds of S. Afghanistan.

Chukor (*C. chukar*) and See-see (*Ammoperdix Bonhami*) are the other items which help to make up the scanty bags, generally made within a radius of fifteen miles of Quetta. By all accounts the last severe winter killed off a great number of these birds, so that now they are comparatively scarce. The See-see is extraordinarily fond of his own particular spot of ground, and you may rely upon finding him there time after time. As the winter advances, however, they disappear somewhere, where, I could never satisfactorily make out, but probably into lower lying country. About the migration I shall say nothing, as I did not arrive in time for the autumn departure and left before their return, but the following is a list of some of the migrants, which remained the winter through in Quetta :—

Wagtails (*M. alba personata*), Redstart (*R. erythronota*), Black-throated Thrush (*T. atrogularis*), Wheatears (*S. Morio, deserts*), Bunting (*E. leucocephala, huttoni*). *Accentor atrogularis*, Starling (*S. vulgaris*), Larks (*A. cristata* and *M. bimaculata*, Pipit (*A. trivialis*).

One of the features of an Afghan landscape is the enormous number of ravens (*C. Lawrenci*). They sit everywhere uttering their peculiar notes, one a deep guttural bell-like note, and the other much more musical, resembling the noise made by pouring wine out of a bottle. They come into Quetta to roost in enormous numbers, as there are no trees worthy of the name to be found outside, but before roosting they sit about on the ground in flocks, perfectly blackening the ground where they are. In the early morning before sunrise they may be seen quitting their roosting-place to disperse themselves all over the country in quest of food.

In company with the latter, or sometimes associating with pigeons, fly flocks of the Hymalayan Chough (*Fregillus graculus*) with their peculiar cry and wild eccentric flight. The familiar English magpie too (*P. rustica*) is exceedingly plentiful at Pisheen, though I never saw one at Quetta, and may be seen in the Surkhab by sixes and sevens at a time, flitting from rock to rock.

I was rather surprised to see one day, so late as December, a common green parrot (*P. torquatus*) flying overhead. I had never heard of them being found so far north before, so concluded it must have been an escaped bird. However, a few days later, I saw a pair flying together, apparently enjoying the severe weather, and these had not the appearance of recently caged birds at all. It would be difficult to say what they could have found to eat, as the trees were perfectly bare at the time, unless they subsisted on what grain they could pick up in the bazaars.

One small bird which I saw up there particularly attracted my attention, and though I tried very hard to procure a specimen for identification, I was unable to do so, chiefly owing to its restless habits, and to the fact that it went over the worst ground on the side of the hills which it could have possibly picked out. Perhaps some of our readers may be able to recognize it from my descrip-

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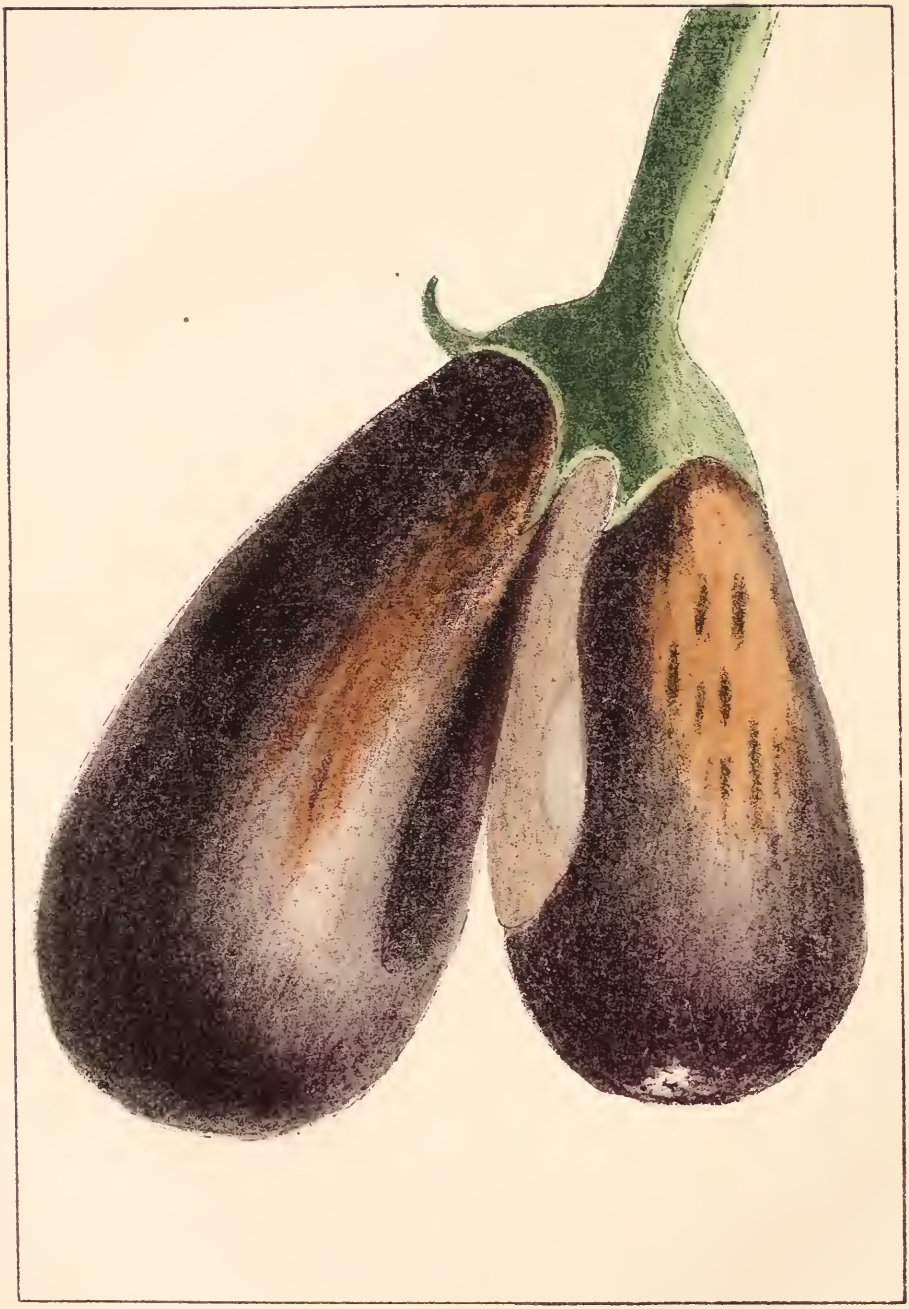

Instance of Teratology in the Brinjal or Egg Plant (*Solanum Melongena*).

(*Triple fruit from a Single flower.*)

tion, *viz.*, about the size of a Stone Chat, and possessing the same habits, of a uniform greyish mud colour, with black-tipped tail and a little white about the head. The thing, however, which attracted my notice most of all was its power of imitation. I heard it myself imitating most loudly and distinctly the common grey partridge. In fact, the first time it completely took me in. A man in the Engineer Department there informed me that he had also heard it imitate a puppy squealing so truthfully, that his dogs became quite excited and began hunting about for the supposed puppy in distress. It then commenced crying like a peewit. It should come from some country where the grey partridge is found, as it could not very well have picked up the cry of the latter in Afghanistan, where the grey partridge does not, as far as I know, occur; but at the same time I do not remember ever reading about powers of mimicry in any bird answering to the description of this one, which is found in the same localities with the grey partridge (*O. pondicerianus*).

Another beautiful little bird, not uncommon in the rivers in Afghanistan, is the Red-winged Wall-creeper (*Teichodroma muraria*), an Alpine bird. It has wings of a lovely crimson and black, the first three primaries being strikingly spotted with white. It is very confiding and will run up a bank in its quick jerking way within a few feet of you, uttering its shrill pipe.

I will now conclude these few observations with the hope that I may be able at some future period to contribute something of greater interest than the bleak hills of Afghanistan can afford.

INSTANCE OF TERATOLOGY IN THE BRINJAL OR EGG-PLANT (*SOLANUM MELONGENA*).

(*See illustration.*)

TRIPLE FRUIT FROM A SINGLE FLOWER.

THIS form of teratology is not common. The pistil—the part of the flower which develops into fruit—is more subject to suppression than to multiplication. This is believed to be due to the position of the pistil in the centre of the flower (where it is subjected to pressure) and also to the fact that it is the last developed of the parts of the flower. Instances, however, do occur in which the carpels are increased. In the present instance there seems to be a simple multiplication, so that the calyx, instead of holding in its cup *one* fruit, has *three distinct ovaries* which are developing into fruits.

Curiously enough, Sir J. D. Hooker says that the *Solanum Melongena*, when it escapes from cultivation, often becomes intensely prickly, and the fruits on the single flower stalk may vary from *one to five!* This looks as if a multiplication of fruits was, in the case of the Brinjal, a result of degeneration.

India, with its exuberance of vegetation, is probably teeming with instances of teratology. Some of the readers of the N. H. S. Magazine might send specimens, or descriptions of specimens, which may occur in their own experience. The double cocoanut is known to occur, and whether there is simply an increase or a diminution of the ordinary structures of the plant, or a change into some other structure, we are assured that many instances of teratology might be sent to our Honorary Secretary during the next few months, which would show how common are the various instances of teratology which are to be found in this country.

D. M.

SPORTING RAMBLES ROUND ABOUT SIMLA.

By J. C. Anderson.

(*Read at the Society's Meeting on* 16*th January* 1889.)

I will suppose that you have a short holiday in October or November and find yourself at Simla. The first want you will feel—at least I always did—was to get out of it without unnecessary delay: those distant snows and forests are too alluring. Some preparations must, however, first be made. In the first place, you must have dogs. Any dog with a nose will do, and it is strange how many dogs have noses, though few of them know it. A fox-terrier, or bull-terrier, trained to use his nose and thoroughly well in hand, is as good for this work as a spaniel or setter,—better I think in many respects,—as he is lighter and not so easily fatigued on those steep rocky hillsides; on the other hand, it must be admitted, he has usually a way of helping himself to pheasant that has to be guarded against. The best dog out of a regular pack of all sorts that it fell to my lot to see was a tiny, mean-looking, yellow *pai*—the most veritable cur you ever set eyes upon—and yet with a nose that was truly marvellous, combined with a judgment that would have adorned the bench. A shikaree, too, you will want—a man who can work the dogs, and who has some knowledge of the country and the sport to be found there. Tents, of course, if you are going to leave the road and the bungalow. They must be small and light, and, like all the rest of your luggage, capable of being carried on mules or on men's backs. If you are going for a short holiday only, with no definite plans made for you by some friend on the spot, I should advise you to stick to the Thibet and Hindoostan high road (a pathway from 3 to 12 feet in width), on which for over 100 miles there are good bungalows, distant some ten or twelve miles from each other. Shooting all that you can reach from these bungalows on either side of the road, you may, if you are keen and in good trim, cover a great quantity of very fairly good ground, and you will be incomparably more comfortable than you could be in tents, with the thermometer at nights well below freezing-point. A servant, too, you must have who can cook, and has some experience of marching in those districts and knows the language of the people. And, lastly, a man who can skin birds. Such a man can almost always, I believe, be got in Simla for a salary of Rs. 15 or Rs. 20 a month, and it adds enormously to the pleasure of a ramble in a new country to be able to collect specimens as you go along. Here before you are some of the birds which I collected on my first visit to Simla, and many more might have been collected. It is scarcely worth while in October or November taking a rod with you, but there is no harm in taking a small trout rod, a few flies, and one or two small flying spoons, which you can get at Luscombe's, of Allahabad, better than anywhere else that I know of. I have not fished myself, being told that at that time of the year it was useless; but a forest officer, whom I met last November, told me he had just caught several smallish fish in the Giri in the direction of the Chor (a big hill not very far from Simla),—I think he said with a fly. If your visit should be in May or June, certainly take your fishing tackle. Both in the Giri to the east and the Sutlej to the west the Indian trout (*Barilius bola*) and mahseer (though not of any great weight) are to be caught and give good sport. So at least I am informed on the very best local authority. At that time of the year, when the upper rivers are full with the melting snow water, the fish ascend the smaller, tributary streams, and descend when the water begins to run fine again at the end of the rains, say in

September and October, after which the fish must be looked for in the bigger waters in the plains below. I would advice you to take a rifle, though it is quite possible you may find little or no use for it. It depends, of course, a good deal on the direction in which you go, and how far. If you are simply rambling round about Simla, which is all that I am now supposing you to intend to do, and nearly all that I can myself pretend to have done, you may not possibly see a four-footed creature bigger than a jackal or a fox. By the way, a Simla fox (*Vulpes montanus*) in autumn (and even more so in winter, I believe) is a beautiful creature. It has, as you see here, a lovely coat and a noble brush : it makes a very handsome rug when properly mounted. There are, however, bears there, and in some places a good many. I have heard of as many as five being shot in one day close to the road. I mean the Himalayan black bear (*Ursus tibetanus*); the brown bear of Cashmere (*Ursus isabellinus*) is very rarely, if ever now, met within this neighbourhood, though I believe there was a time not so very long ago when it was not so scarce. The Barra-singh of Cashmere (*Cervus cashmirianus*) too is another animal which used occasionally to be seen in this district, but has been crowded out by the multiplication of guns. Goral, however (*Nemorhædus goral*), a small species of mountain goat you will find in some places, and those not far from Simla, pretty plentifully, I believe. I have heard local sportsmen speak disparagingly of goral shooting as very tame work, and, to judge by some accounts of it I have heard, it must often be so. My own experience was as small as it well could be, but the one I saw and shot, on the only occasion I ever went after goral, gave me as pretty an afternoon's walking and climbing on a steep hillside among oaks and ferns and rhododendrons and grand grey crags as one could well wish to have. If your larder is low, you will not despise goral; a laddle of goral is by no means to be contemned, even if you do not strictly follow the advice a serjeant pensioner gave me, to be "sure and hang it three weeks, Sorr." Tahr and burrehl and even ibex you may meet if you go far enough; but I will not say how far that may be. I never saw any of them though I have come across pugs (on a retired part of Hattoo, I think), which doubtless belonged to one or other of them. I could not make out from my shikaree to which. It is not your rifle then you must depend upon for your sport, but your gun. For this you may always find some occupation pretty well anywhere in that neighbourhood. If you must have big bags, you will almost certainly be disappointed ; if you are content with a grand day's walk and a moderate bag, hardly and honestly won, you need scarcely ever be so ; and, of course, it is to the pheasants that you will chiefly look to provide you with your amusement and fill your larder. Wherever there are trees or even bushes, though it be on the very roadside, you feel you are not quite safe from one or other of that game and handsome family. The pheasants that you may expect to meet at this season of the year are practically four only, unless, indeed, you go somewhat further afield than I am now contemplating your doing. These are the monal (*Laphophorus impegamus*), the koklass or pukras (*Pucrasia macrolopha*), the cheer (*Phasianus wallichi*), and the white-crested kalij (*Euphocanus albocristatus*). The handsome jewar or so-called "Argus Pheasant" of that region (*Ceriornis melanoscephala*), one of the tragopans (we had a live specimen in these rooms lately), is still, I believe, to be met with in the higher regions of forest, somewhat more remote from Simla, but not except quite as an exception within the regions I am now considering. It is a shy bird apparently, of somewhat meditative, if not gloomy disposition, favouring the darkest depths of the remotest forests. Yet curiously, as pointed out by more than one writer on the subject, it seems to be the most easily tamed of all the Hymalayan pheasants ; while the kalij, which in its wild state seems scarcely happy far away from the sound of the human voice, is the most difficult.

The moonal and the koklass, and specially the former, are distinctly forest birds, loving the dark dense forests of deodar, juniper, and yew, while the cheer and the kalij prefer somewhat more open ground interspersed with woods of pine oak and rhododendron, with a thick undergrowth of bushes, ferns and grasses. The moonal I have not found at a much lower elevation than 7,000 feet; the koklass seldom below 6,000 feet ; from 5,000 or lower to 7,000 seems to be the favourite region of the cheer and the kalij. Though all four birds are now, I believe, universally regarded as pheasants, you will see from the specimens I have before me that they differ from one another very considerably in character. There is no mistaking the cheer with his typically long tail for anything else than a pheasant. A cock cheer in form and feature, though not in colour, differs very slightly from the cock pheasant of our English covers, and is about the same weight, say 3½ lbs. The koklass is evidently a near relation, being a typical pheasant in all respects, save that he is wanting in the long tail feathers. But the moonal, with his gorgeous blue, green, copper, and bronze tints, his peculiar upright crest, and his compact thickset body, and strong, short legs, evidently adapted for digging, is obviously as nearly related to the peacocks as he is to the pheasants; while you have only to look at the tail of the kalij to see his relationship to the next sub-family at the other end of the scale, *viz.*, the gallinæ—comprising the jungle fowls, firebacks, &c. All four birds seem distinctly to prefer shade to sun and damp to dryness. The neighbourhood of running water seems almost an essential with all of them. In short, such as the fern is in its choice of locality, so is the pheasant; the two are evidently firm friends. As with trout and many other fish you are pretty sure to take day after day behind the same stone or in the same eddy, so it was I found, not always for any apparent reason with these pheasants. There were certain spots, for instance, on the road from Narcanda to Bhagi (which, by the way, passes through one of the grandest pieces of forest scenery I suppose to be seen on any roadside in the world, where the deodars must some of them be quite 200 ft. high, with their dark sombre green veiled in many cases from top to bottom in the flame-coloured leaves of the virginia creeper). There were certain spots on this road, where in my visit of three years ago I was sure day after day to find a bird or two in spite of the fate that had overtaken their predecessors at the same spot it might be only the previous day. On visiting the same locality last November, there, in the very same spots, I nearly always found birds. The moonal, the koklass, and the kalij seem to spread themselves pretty indiscriminately over the area where the conditions they require are to be found. It seems curiously otherwise with the cheer. One little valley may hold cheer, and a dozen all round, where apparently the conditions are precisely the same, may not hold a single one. I have heard of residents of Simla shooting regularly for years together all round the neighbourhood, and never so much as seeing a single cheer, and then subsequently coming on them by chance one day in some place not previously shot over though perhaps quite close to Simla and always thereafter finding them in the same place year after year. I was fortunate enough on this last visit to Simla to be shown one of these haunts of the cheer, from which these three specimens I have here were secured. The ground corresponded very accurately with the description of the favourite locality of the cheer given by Messrs. Hume and Marshal in their well-known work. The hillside on which they were found was composed of a number of little cliffs one above the other, each perhaps from 20 to 30 feet high, broken up by ledges on which one could barely walk, thickly set with grass and bushes, and dotted sparingly with more or less stunted trees, with curious roots hanging down the little cliffs and long trailing arms of scarlet creeper. I had a red setter and three spaniels with me. The setter was put to range over the whole hillside; men were stationed at various points to mark down the birds while we sat on a knoll opposite and looked on, a deep ravine lying between. It was a pretty sight to see the dog working half-way up the hill. Soon there might be seen, scuttling up hill at an amazing pace, across the little open glades between one clump of brushwood and another, a family party of some five or six cheer, their heads down and long tails drooping. The dog soon overtook and flushed them, and then all eyes were wanted to mark down each bird. The birds have pitched in various places only a little lower than where they were flushed, having wheeled round to the right and left soon after they had got on way. You cross the ravine and ascend the hill on the other side. You find it is much stiffer work than it looked, requiring a good head and a careful use of your feet. At last you get to the destined spot below bird number one, and as close as you can conveniently get thereto, it may be 20 yards or it may a 100 or more. You have a most insecure footing, and you are not quite sure that your gun going off will not remove you from it; but you mean to have a shot at that cheer, though you perish in the attempt. The shikaree climbs up still higher to flush the bird with the spaniels at his heels. After a good deal of beating of bushes and inciting of the dogs, a great fluttering is heard overhead, but it may be out of sight. The next moment a mighty rush as of some archangel, in a hurry; you spin round, let off your gun, and upset yourself, all in the twinkling of an eye; and if you get that bird, it is probably, as Mr. Hume remarks, not the first time you have shot cheer. If you do not get him, he is again marked down, probably on some lower slope of the same hill, where you may with perfect confidence leave him till you have looked up, by a similar process to that first described, the other birds originally flushed. It is curious how close these birds will sit when put up once or twice. You may leave them half an hour and find them under the very bush you saw them pitch in; and you may beat that bush, or cause it to be beaten, till you are on the point of being convinced the bird must have gone, when up it gets almost under your very nose, and shoots with tremendous velocity down hill. This grand bird is, as I have already stated, even now very scarce in the neighbourhood of Simla, and I very much fear it will soon disappear altogether; its ways and habits laying it open to complete extinguishment more than do those of other pheasants. The rest, I think, will always be sufficiently able to take care of themselves, a wise Government now protecting them in the breeding season, in common, I believe, with all game birds of that region. I must not detain you long on the subject of the three other species of pheasants I have mentioned. As to the moonal, it is more easy for me to be brief, inasmuch as the bird is now comparatively scarce in any easily accessible part of the neighbourhood of Simla, and it is certainly by no means true now, and of that locality, whatever may have been the case when "Mountaineer" wrote (so often quoted by Mr. Hume and by Mr. Barnes), "that the most indifferent sportsman will find little difficulty in getting the moonal." This is because it has been and is so much shot for its gorgeous plumage, a small piece of which, a lady tells me, costs as much as a guinea or more at a fashionable West End bonnet shop. The man I had with me this year to skin what I shot told me he had himself skinned some 2,000 last season for one firm of exporters in Calcutta, the majority of which, I believe, came from the neighbourhood of the Chor—a hill some twenty miles (as the crow flies from Simla, but somewhat rugged and inacessible and removed from any good road. From what little I have seen of this bird I can quite imagine that the best sport with it would be got by shooting it, as suggested by "Mountaineer," with a small rifle. Such a rifle as the ·320 or ·380 bore, Winchester, which Mr. Phipson is exhibiting here, and which I have lately had opportunity of proving to be a wonderfully accurate and reliable little weapon. The bird has a habit, when first flushed by dogs, of getting into a bare branch of some lofty tree, and thence abusing with great loquacity the disturbers of its peace. While so engaged, you may approach to within some 80 or 100 yards of it by using the cover of intermediate trees, and at that distance it affords a good mark for such a weapon. It is difficult to approach near enough for an effective shot with a shot gun, and the bird is so very wideawake (though "Mountaineer" somewhat quaintly assures us that there is nothing of guile in its nature) that, when once on the wing, it seems to have a very good notion of where the guns are and how they are to be avoided. I once saw the sight that seems to have impressed "Mountaineer" so, and small wonder—a cock moonal, his peacock-erect sailing across a valley, with all his gorgeous plumage shivering and shimmering in the sun with a curious vibratory movement. A very living glittering rainbow it was: a sight that almost took your breath away. I was with a companion who did not shoot himself and would rather discourage shooting in others. I am happy to say, though, that he could play as good a knife and fork game as any of our party when a pheasant was on the table. "What on earth is that?" he said. "Why, that is a cock moonal," said I, somewhat testily, a bird he knew I very much wanted to get a specimen of. "And do you mean to say you would be brute enough to shoot that glorious thing?" he asked; and for once I almost doubted whether there might not be something in what he said. The kalij and the koklass I will dismiss with but a few words, not because there is not much to be said about them, or that they are unimportant to the Simla visitor. Quite the contrary is the case. They will form the mainstay of your larder and give you most of your sport. Both birds, if not old roosters and properly kept (you can hang them well nigh a week at that time of the year), are most excellent eating, every bit as good as an English pheasant in my opinion. And both give excellent sport. The two are found in somewhat different ground, as I have before stated, but the mode of shooting them is much the same. The guns are below and the dogs and one or two men above. The ever welcome short bark, followed by a hurried "clinking" of the frightened bird, is heard above, "Ata, Sahib," "Ata, Sahib," rings down through the trees, followed almost instantaneously by a rushing thunderbolt to your right or left, or coming straight for you out of the trees in your front; then somehow your gun goes off, and, if you are on the spot that morning, a crash is heard through the tops of the trees below you, and your faithful retriever is soon seen proudly wagging his tail with the bird in his mouth. You do not very often come across either of these birds collected together in more than twos or threes. Sometimes, however, you will be fortunate enough to light on a regular "hot corner," and have five or six down on you more rapidly than you can well load. Those are moments to live for. The joy of battle is yours. Every nerve is braced, every sense strung at its highest pitch. You feel you are being stormed, and that you must rely solely on the keenness of your own eye and the steadiness of your pulse. Perhaps, when all is over, you smile at your own excitement: yet many things you may forget before you forget those few moments. Both these birds are amazingly quick on the wing, and almost invariably fly straight downwards; sometimes indeed a bit too straight. It is as much as you can do sometimes to avoid being knocked down by a bird you have just shot. I have had the shikaree at my side bowled over like a ninepin and rendered considerably foolish in this way. When flushed by dogs alone, both these birds will often at first, especially in the afternoons, perch on some tree, whence they will keep up their excited cackling for a considerable time. This is the moment of your shikaree's reward; you give him your gun and he stalks *ventre-à-terre* (the favourite attitude of the Duke of Wellington, according to the French books of my youth) through the trees, and pots the bird on the bough. It is wonderful what eyes these men have for a bird in a tree; they will often see them in passing without anything having occurred to cause them to expect to see a bird there, and it is almost certain that their efforts to make you also see the bird will be altogether unavailing. Many and many a long day spent on their own account with just one cunning little dog and some old "shooting iron" is, I fancy, the secret of it. On this topic, however, you will not find your shikaree prepared to be over-confidential. Nearly related to the pheasant is the red-jungle fowl (*Gallus ferrugineus*). If you keep to the higher ground, 5,000 ft. and over, you will not come across this bird; but down in some of the valleys, especially near the rivers (if you are fishing), this bird, I am told, in many places gives good sport. We come now to the partridges. In this family there is one bird at least that deserves most honorable notice. This is the chuker or red-legged partridge (*Caccabis* chukor), a very near relation of, if not identical with, our friend the "Frenchman" (*Caccabis græca*). This bird will test all your powers of walking, all your boasted accuracy of shooting, all your endurance, and all your patience. Open, broken ground in the neighbourhood of cultivation is their favourite resort, on which, while still, they are exceedingly hard to see. If they were not such arrant chatterers, they might perhaps have a comparatively great life of it. There must be an awful struggle for "the last word" amongst chukors. I fancy they must sometimes quite welcome the gun as an occasion for changing the subject. Your shikaree takes base advantage of this little weakness of the chukor (which, however, they only indulge in early and late in the day while feeding). He sends men out to mark them down very early in the morning, while the grey snows are still asleep, and the stars are flashing their last and brightest in the clear black sky. Poor fellows, wrapped in their blankets, how cold they seem when you come up with them some hour or two later, when the sun is just touching the hill top ! Then, directed by your watchmen, you begin to look up one of the coveys they have marked down for you, working round and below the birds, and then very quietly walking them up. These birds are very strong and take a good deal of shot. They get up wonderfully smartly and are off in every direction. If you secure a right or left, you are to be congratulated. Your men all over the ground are on the look-out to mark down the birds which almost invariably separate, and often go some considerable distance before they pitch in some bush clump of grass or scrub. You must lose no time in looking up each group one by one ; if you have more than one gun, the guns should separate and divide the walk, as success in making a bag of chukor depends on leaving the birds no time to regain their composure. Constant and rapid disturbance seems to make the birds a bit "mazed," as they say in Devonshire, and increases your chance. But shoot as you will, and walk as you will, probably you will not be too pleased with your performance when all is over and done, not at least while you are still a novice at chukor shooting. A chukor, I may add, is excellent eating. The only other partridge I recollect seeing on these hills is this very handsome little bird you see here—one of the wood or hill partridges (*Arboricola torqueolas*). It is essentially a forest bird. You may expect to find it where you would find the (arboricola or torqusolas) pheasant. This specimen I shot in the Bhagi forest: it was dusk, the bird was alone, and it flitted through the trees and pitched on a bare bough, some fifty yards off, in such a way that I almost thought it must be some species of owl. My shikaree told me these birds were pretty numerous in that neighbourhood, but I cannot remember having seen more than that one. Other partridges as well as quail are to be got in the lower regions of the valleys. The last game bird I will mention is our old friend the woodcock (*Scolopax rusticola*). This bird is occasionally met with near Simla as early as the end of October or beginning of November, when working for the kalij pheasant; but it is then, at any rate, decidedly scarce. I do not doubt that a few weeks later there must be a good number of them scattered about in the neighburhood, but the forest in most places is so extensive, that the birds are hard to find. In the not very distant Kulu Valley, I have been told on the best authority that the woodcock shooting in the winter is first-rate. Such then is the sport you may expect to find in a ramble round about Simla. If time had allowed, I should like to have said something as to the delights there prepared for the artist and the botanist. Without being exactly either, your daily ramble is a continual feast to the eye. You are gladdened by the red and golden autumn tints of the chestnut, the walnut, the wild pear, and wild cherry; the deep dark green of the deodar is here and there aflame with the scarlet virginia creeper; the soft grey of the steep crags, ever and anon breaking the monotony of the dark forest, is a perfect marvel of mosaic in purple and madder, carmine and orange—scarlet, green, and ochre. Underfoot it is well nigh in some places all fern, the maiden hair and the exquisite *parsley* fern being the most conspicuous; on the open hill sides you recognise your old friend the silver-stemmed raspberry and the bright yellow and scarlet clumps of the barberry; you stoop to pick a lingering wild strawberry beautifully powdered with white crystals of frost, or a modest white violet, or mauve marguerite; and when the day's delights are at last all over, and the last lingering flush has left the snows, you are back at your bungalow, where a roaring wood-fire awaits you, you have a good dinner of Welsh mutton (it is nearly as good) and roast pheasant, smoke the pipe of peace, muse or talk a bit over the cheerful flame, pile on the logs and tumble into bed.

AT MALTA TO AND FROM INDIA.

By Capt. E. F. Becher, R. A., F. Z. S.

The homeward and outward traveller has generally a longer or shorter stay at Malta; the popular attractions, as held out by the native tout, are the Palace, St. John's Church, Dried Monks and San Antonio Orange Gardens; but there are other attractions to any one with a leaning to Natural History. Of course, the market should be visited. Six a. m. is none too early, because many of the birds brought in are at once plucked; every bird that flies is slaughtered, when possible, and brought to the market; and, of course, during the spring and autumn migrations these are in great variety. Any small bird is a *Beccafico,* and though I have spent some years in the Mediterranean, off and on, I yet have not a clear idea what a *Beccafico* proper is, but I believe that it is the Garden Warbler (*S. salicaria*). A curious ornithological dainty, which the Maltese are especially fond of, is a portion of the back of a hen, with the adherent well-developed ovaries.

I obtained once in the market a specimen of a Stone Curlew, and on dissection the whole of the stomach cavity was filled with one large snail (*Helix vermiculata*). This bird's gullet must have been most distensible to have got it down. Many birds are brought to market alive. Amongst others, the Yellow Wagtail (*M. flava*). This bird is easier tamed than any other bird I know. The Maltese clip their wings and keep them in their shops and kitchens in order to catch flies. One I had within five days of capture would come to me and feed out of my hand, and whenever I was skinning a bird, he would always come on to the table and catch the flies, which always, of course, were present in numbers. On one occasion he got a little tow entangled in his claws; so I had to hunt him down, catch him and disentangle it, which would have frightened any other bird, but when I put this wagtail down, he just shook himself and went on pursuing flies on my table as usual. There is a fair collection of birds in the Museum of the University. To view this all you have got to do is to walk inside the University building, which is close to the market, and ask permission from the Professor of Natural Science or any one else. There is a MS. catalogue, but some of the birds, notably a Lark or two, are incorrectly labelled. The Isabelline Nightjar (*C. ægyptius*) should not be overlooked, as only few European killed specimens are in existence.

There is also a collection of land shells there, but I forget whether the Maltese shells are separated, but I think so. The land and fresh water molluscs of the Maltese Group though small (not much above forty) are most interesting, six, *viz., H. melitensis,* Fér., *H. Spratti,* Pfeiffer, *Clausilia scalaris,* Pfeiffer, *C. mamotica,* Gulia, *Physa melitensis,* Ben., *Paludina melitensis,* Ben., being peculiar to the Group.

The characteristic fossils of the Malta formations are Echinoderms, and probably a collection can be seen here. Another object to be looked for is a specimen of the black variety of the Common Green Lizard. The latter is common all over Malta, but on the islet of Fifla, which is a mere rock, it is replaced by a black variety. The *raison d'etre* of this black variety is not, I believe, properly ascertained; but Professor Giglioli, of Florence, writes that he has invariably found that our Common Lizard (*P. muralis*) constantly presents dark varieties *in islets adjoining small islands*. This islet of Fifla is also a breeding place of the Manx Shear water (*P. anglorum*) and also, I believe, of *P. griseus*. When I visited it in April I only took eggs of the former, though I captured and let go again one or two of the latter. But as Fifla is not likely to be visited by the voyager, I will say no more about it. A walk round Manoel Island is interesting, poking about at the edge of the sea. After rain some fresh water pools are left amongst the rocks; in some of them may be seen a large Entomostracan, at first sight like some bivalve swimming about: this is *Estheria melitensis,* and any observations concerning it are worth noting.

Another interesting stroll is on the rocks beyond Ricasoli. Many fossil shells and echinoderms, &c., will be seen *in situ,* and perhaps a shark's tooth or so, the Malta formation being a great repository of the latter. The Malta rocks can be divided into 4, the upper being a coral limestone and below this sand. No. 2, marl. No. 3, sandstone. No. 4, semi-crystalline limestone, but for more detail I would refer to Leith Adam's book on Malta and Spratt's Geology of Malta, which can be seen in either the Garrison or the Public Library. The great geological feature is the large fault across the island, forming the Benjemma height. A good way of occupying spare time, better than by loafing about Valetta, is to take train to Notabile and then drive to St. Paul's Bay. A very good idea of the island can thus be got. At St. Paul's Bay, just opposite the little island of Salmone is the restricted area for *Clausilia scalaris* before mentioned. This Bay is—" When it was day they knew not the land but they discovered a certain creek with a shore into which thay were minded if it were possible, to thrust the ship * * * and falling into *a place where two seas meet* they ran the ship aground. * * *" This *place* is said to be the strait between Salmone and the mainland.

Books to read on a voyage are often inquired for. If before reaching Malta the History of the Knights of Malta can be read, it will add much to the interest of the place, especially to those who can picture the past in the present. Just inside the Gate of St. Elmo is a small chapel, in this chapel the Knights being driven to the last extremity and nearly all wounded, received the last Sacrament, and then went out to die, the wounded being propped up in their places. A hand-to-hand fight in the grand harbour, the combatants swimming, is an episode not likely to be repeated in modern days.

MISCELLANEOUS.

BOMBAY BUTTERFLIES.

To the Editor of the Journal of the Bombay Natural History Society.

SIR,—The following note of captures made last year may interest your entomological readers. I find on reference to my diary that between 12th August and 23rd September I had secured on Malabar and Cumballa Hills alone 50 different species of butterflies and 34 different species of moths.

On 26th August I caught in the compound of the house in which I live on Cumballa Hill, two specimens of *Danais dorippus*, of which Mr. Aitken writes at page 127 of the first volume of the Society's Journal, that there is only one specimen in the Society's collection, and that he has never met with it in Bombay, but believes it to be an occasional variety of *Chrysippus*; and of which Mr. Newnham writes at page 220 of the same volume that he had seen two specimens in Cutch and heard of a few more at Mandvie. I have never seen any other specimens than the two I caught, and believe with Mr. Aitken that they are merely an unusual variety of a very common species, *Danais Chrysippus*.

On 23rd September I caught, about half mile beyond the upper end of the Vehar Lake, a beautiful specimen of *Myrina Atymnus*, the only one I have ever seen, of which the Society appear to have no specimen, and which Drury notes as "rare" among Indian butterflies.

It may also interest some of your readers to know that during the last week in July the shy white-browned bulbul, *Ixos Luteolus*, built in a hanging basket of ferns under my porch, and laid two eggs, of which I took one. The hen continued to sit on the other, but laid no more, till unfortunately a careless passer-by struck the basket, upset the nest, and broke the egg, when the hen deserted I never saw the cock bird about the nest after the eggs were laid.—Yours, &c.,

W. E. HART.

Cumballa Hill, Bombay, 20th March 1889.

A BIRD-CATCHING SPIDER.

WHEN Madame Merian mentioned in her "Insects of Surinam" the existence of a bird-catching spider in the Settlement, her account, though believed at the time, was discredited shortly afterwards, and her statement set down as untrustworthy and exaggerated. No spider, it was believed, either caught or preyed on birds, and experiments were tried with the arachnoid in question (*Mygale avicularia*) by Langsdrof, MacLeay and others to test the truth of her assertion and, resulting in failure, the whole account was rather summarily set down as a fabrication, pure and simple. Later on, however, M. Moreau de Jounes, who spent many years of an observant life in Martinique, and was consequently well qualified to speak on the habits of these huge spiders, bears out Madame Merian's account, and distinctly states that "it climbs on the branches of trees to surprise the *Colibris* (humming birds) and the *Certhica flaveola.*" M. Palisot de Beauvais also asserts that *M. Blondii* is known to kill and devour birds, and Percival in his account of Ceylon says the same of *M. fasciata.* That spiders of the genus *Mygale* do catch and eat birds is, I think, now pretty well acknowledged, and the following account given to me by a lady, in whom I can repose the utmost confidence, will serve as another case in point to establish this fact :—

A few years ago, a pair of martins* built their nest in the verandah of this lady's house on the Shevaroy Hills, and, as she always takes a lively interest in animate nature, she allowed the birds to remain undisturbed, and watched with keen interest the process of building and incubation. On coming out one morning, however, she was surprised to find the parent bird missing from the nest, and on looking about the verandah her eyes fell on a huge spider with the bird in its clutches. Summoning her husband to her assistance she bade him despatch it, but bird and spider were so mixed up that this was no easy matter, and the arachnoid escaped into its den in the wall. On examining the bird it was found that the skin only was left, the breast and other portions having been completely eaten up. The spider had evidently caught the bird at night (the usual hunting hours of the Mygalidæ), and had carried it along the rafters, a distance 2½ yards, to the entrance to its abode and there eaten it. The spider in question, from the description given of it, must have been *M. fasciata*, a species not unknown on the Shevaroys.

A. W. MORRIS.

ENGLISH NOMENCLATURE FOR INDIAN BUTTERFLIES.

To the Editor of the Journal of the Bombay Natural History Society.

SIR,—It must have struck many people, besides myself, as very strange that we have as yet no English name for our Indian butterflies, except, perhaps, a very few for insects resembling English ones. In England the majority of common butterflies have one, if not more popular names, more or less appropriate, and some even poetical and beautiful. These names are principally derived from some striking feature in their appearance or peculiarity of habit. Surely our Indian butterflies are not so devoid of peculiarities that our ingenuity cannot supply them with some simpler, more expressive names than long, double barrel Latin ones, which convey nothing of the insect's appearance or habits. I think, if anything, our Indian butterflies possess a much more varied life history and distinguishing peculiarities. Another useful point to be gained also would be that we should learn a great deal more about the life history of butterflies, as many keen observers of nature would send notes and observations, who now omit to do so, as, not knowing the scientific name, they are at a loss to distinguish the butterfly of which they wish to speak.

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* Judging from the birds that have now built in the same spot these must have been *C. concolor.*

What I would suggest then, is that various well known lepidopterists should be written to with a request to send a list of suggested names to be laid before a Committee of our Society, who would accept the ones which seemed to them the most appropriate. A list of names so selected might then be printed and circulated for information to various Natural History Societies.

Of course, I do not for an instant suppose that these names will be accepted generally at once, or that it is an easy matter to name such a mass of butterflies; but at any rate it would be a beginning, and I think our Society might fairly claim to have done good service in the cause of Indian entomology if we caused a standard list of English names to be published.

A. NEWNHAM,
Bombay S. C.

Poona, 23rd *March* 1889.

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PROCEEDINGS OF THE SOCIETY.

Proceedings of the Meeting held on 16th January 1888.

The usual monthly meeting of the members of this Society was held on Wednesday the 16th January, Dr. D. MacDonald presiding:—

The following new members were elected:—Mr. Srimant Hanmantrao Gopalrao (Sai Lashkar Saheb Bahadur), Dr. Eduljee Nusserwanjee, Captain J. F. C. Thatcher, Mr. E. C. S. Baker, Mr. C. F. Elliott, Mr. Ed. Wimbridge, Mr. Cursetjee N. Servai, Mr. H. L. Harvey, C.S., Lord Colin Campbell, Mr. P. R. Wilson, Mr. R. N. Mant, and Colonel Merriman.

Mr. H. M. Phipson, the Honorary Secretary, then acknowledged the following contributions to the Society's collections:—

Contributions during December.

Contribution.	Description.	Contributor.
1 Lizard	Hemidactylus sykesii ...	Mr. E. H. Aitken.
A Porcupine's Skull ...	Hystrix leucura	Mrs. Scott.
1 Snake	Passerita mycterizans ...	General LaTouche.
1 Snake	Typhlops porrectus... ..	Mr. B. F. Farnham.
An Elephant's Skull ...	Elephas indicus	Mr. T. Drewett.
A Lion Monkey	Macacus silenus	Mr. Cowasji D. Limji.
A purple-capped Lory (alive)	Psittacus domicella	Mrs. M. C. Turner.
1 Starred Tortoise (alive) .	Testudo elegans	Mr. H. E. James, C.S.
1 Mongoose (alive)	Herpestes griseus	Mr. H. R. Cobbold.
Several Birds' Skulls ..	From Khandalla	Mr. F. Prideaux.

Minor Contributions.—From Captain Shopland, Mr. M. P. Misquita, Mr. E. Beynon, and Mr. W. R. Hamilton.

CONTRIBUTIONS TO THE LIBRARY.

Journal of the Asiatic Society of Bengal, in exchange. Proceedings of the Royal Society of Victoria, Vol. I., Part I., in exchange. Proceedings of the Linnæan Society of the New South Wales, Vol. III., Parts II. and III., in exchange.

Mr. J. D. Inverarity exhibited three very fine heads which he had lately received from Nova Scotia, *viz.* :—A moose (*Alces malchis*), a wapiti (*Cervus canadensis*), and a Rocky Mountain sheep (*Ovis montana*).

Mr. Tytler exhibited a picture of "a tiger's head" (life size), replicas of which were to be had for Rs. 100 each.

The Honorary Secretary also drew attention of the members to the "Shikari Bed." This bed, which weighs only 20 lbs. complete, was exhibited by Mr. John Wallace, C. E. Similar ones to be obtained at Rs. 25 each, on application to the Clerk at the Rooms of the Society. Mr. J. C. Anderson exhibited a collection of birds from Simla, which were greatly admired and afforded valuable illustration to his interesting paper on "Sporting Rambles round about Simla."

PROCEEDINGS OF THE MEETING HELD ON 19TH FEBRUARY 1889.

The usual monthly meeting of the members of this Society took place on Tuesday, the 19th February, Dr. G. A. Maconachie presiding.

The following new members were elected:—Mr. F. A. Spencer, Mr. Stanley Tyler, Mr. G. C. Gilder, Mr. Max Denso, Mr. A. Taylor, Mr. A. Abercrombie, Mr. Douglas Bennett, and Mr. T. D. Little.

Mr. H. M. Phipson, the Honorary Secretary, then acknowledged the following contributions to the Society's collections:—

CONTRIBUTIONS DURING JANUARY.

Contribution.	Description.	Contributor.
1 Jungle Fowl	Gallus sonnerati	Mr. A. Taylor.
A quantity of specimens of Quartz Crystals from Parel.	....	Mr. H. W. Barrow.
1 Indian Barn Owl	Strix javanica	Mr. J. Spinner.
A quantity of Shells ...	From Karwar	Mr. Leckie.
1 Young Jackal (alive) ...	Canis aureus	Mr. Louis P. Russell.
2 pairs Jungle Fowl (alive)	Gallus sonnerati	Mr N. S. Symons.
1 Snake	Lycodon aulicus	Mr. F. Kirby.
1 Victoria Crown Pigeon ...	Goura victoriæ	Victoria Gardens.
1 Pelican	Pelecanus crispus	Do.
A number of Insects ...	From Smbulpore	Mr. Mitchell.
66 Birds' Skins	From the Punjab	Mr. E. V. Buck.
1 Snake	Passerita mycterizans ...	Mr. Alex. McKenzie.
1 Snake (alive)	Tropidonotus plumbicolor ...	Mr. H. Littledale.
1 Indian Barn Owl (alive) .	Strix javanica	Mr. E. Wimbridge.
1 Jungle Fowl	Gallus sonnerati	Lieut. A. F. Pinhey.
1 Avocet	Recurvirostra avocetta ...	Mr. J. D. Inverarity.
A Porpoise (alive)	Neomeris karachiensis ..	Mr. W. F. Sinclair, C.S.
2 Greenshanks	Tottamus glottis	Mr. F. Otto.
1 Scaley Ant Eater (alive).	Manis pentadactyla ...	Purchased.

Minor Contributions.—From Mr. G. C. Gilder, Mr. F. Southwell Piper, Mr. G. McMullen.

The Honorary Secretary drew the attention of the members present, to an offer which had been made to the Society by Mr. Prevost of five live tiger cubs, but which it was impossible to accept.

CONTRIBUTIONS TO THE LIBRARY.

"British Museum Catalogue of Birds," Vols. I. to XII., Captain Becher, R.A.

"Sagacity and Morality of Plants" (Taylor), Captain Becher, R.A.

"Records of the Geological Survey of India," Vol. XXI., Part 4, in exchange.

"The Indian Forester," Vol. XV., Parts 1 and 2, in exchange.

EXHIBITS.

Mr. E. L. Barton and Mr. S. Tytler exhibited a number of heads of sambur, wild boar, cheetah, and jackal mounted by them. The Honorary Secretary stated that the staff of taxidermists had been increased, so that the Society was now in a position to undertake more work of this character than hitherto.

Captain E. F. Becher, R. A., exhibited a photograph of a black buck, with curiously deformed horns, the result of emasculation.

THE SOCIETY'S PRIZE.

The Honorary Secretary stated that the prize of Rs. 100 offered by the Natural History Society for the best animal painting at the Art Society's Exhibition had been eagerly competed for, and had produced a number of interesting pictures. The prize had been awarded by the Judges to Mrs. Scott, for an excellent study of camels.

It was proposed and carried unanimously, that the congratulations of the Society be conveyed to Mrs. Scott for her success in winning the Society's prize.

THE ACCOUNTS FOR 1888.

Mr. A. Leslie, the Honorary Treasurer, then read a statement of the Society's finances for last year, showing an income of Rs. 7,078. The accounts were duly passed, subject to the audit of Mr. John Wallace, C. E.

FACILITY FOR LANDING SPECIMENS.

Mr. W. F. Sinclair, C.S., stated that, as the Society had experienced considerable difficulty in landing specimens of fish—porpoises, turtles, &c., addressed to them—at the Apollo Bunder, he begged to propose the following resolution:—"That whereas there are occasionally delays and difficulties about landing fish and other things for this Society, the Committee should instruct the Honorary Secretary to address the Port Trust with a view to obtaining permission to land at the Apollo Bunder any articles plainly addressed to the Society at its Rooms, 6, Apollo Street."

Mr. Sinclair then read a very interesting paper, entitled "A Creek of the Konkan," containing a graphic description of the birds and animals seen in the estuaries and creeks of that part of the country.

PROCEEDINGS OF THE MEETING HELD ON 5TH MARCH 1889.

The usual monthly meeting of the Bombay Natural History Society was held at the Society's Rooms on the 5th March 1889, when Mr. R. Gilbert drew the attention of the members to the recent rules issued by the Chief Commissioner of the Central Provinces relating to shooting and fishing in the reserved forests of that part of India.

Mr. J. D. Inverarity presided, and there was a very large attendance of members, those present including Mr. W. Lee-Warner, the Hon. Mr. Justice Parsons. Mr. C. P. Cooper, Captain Olivier, Mr. E. L Barton, Dr. Banks. Dr Weir, Dr. D. MacDonald, Mr. J. Jefferson, Mr. J. D. Steel. Mr. L. P. Russell, Mr. F. L. Charles, C.S., Mr. Reginald Gilbert, Mr. M. C. Turner, Colonel Major, and Mr. H. M. Phipson, the Honorary Secretary.

The Secretary having read the notice convening the meeting, Mr. Gilbert, at the request of the Chairman, read the rules issued by the Chief Commissioner, which are as following :—

NOTIFICATION.

The 29th November 1888.

No. 6925.—The Chief Commissioner is pleased, under Section 25 (i) of Act VII. of 1878 (The Indian Forest Act), to prescribe the following rules to be in force in all "Reserved Forests" in the Central Provinces :—

I. The poisoning of water for any purpose whatever is prohibited.

II. 1. Hunting, shooting, fishing or setting of traps or snares is prohibited except with the permission in writing of the Deputy Commissioner or a Forest Officer duly authorised by him or by the Conservator of Forests in this behalf, and specifying the particular forest or forests to which the permission applies, and the period for which it is current.

2. The permit may either be general or may restrict the holder to the hunting or shooting or trapping or snaring of particular species, or may prohibit the hunting or shooting or trapping or snaring of any particular species.

3. The permit shall specifically prohibit the destruction or capture of animals of any species in respect of which the Chief Commissioner has directed the observance of a close season, during the term of such close season.

4. The permit may impose restrictions upon the choice of camping grounds within the forests, and shall in all cases specify the number of companions, retainers, followers, and animals which the holder of the permit may take with him into the forest.

5. Any permit granted under this rule shall be liable at any time to be cancelled by order of the officer granting it or of the Conservator of Forests, and shall cease to be valid in the event of fire occurring in the forest to which it applies.

6. Forest Officers of and above the rank of Sub-Assistant Conservator of Forests are exempted from the operation of this rule within the limits of their respective charges.

III. Any breach of the Forest Act or of any rules made under that Act by the holder of a permit granted under Rule II., or by his retainers, shall entail forfeiture of such permit.

IV. Nothing in these rules shall exempt the holder of a permit granted under Rule II. from liability under the Forest Act, or any other law, for anything done in contravention of such law, or for any damage caused by him or his retainers.

V. The fees to be charged for the permit issued under Rule II. shall be as follows :—

1. A fee of one rupee per diem for each sportsman or shikari follower entering the Reserve.

2. A fee of eight annas per diem for each elephant or camel entering the Reserve.
3. When the permit authorises a camp to be formed within the limits of a Reserve, the pay and allowances of a forest subordinate to be deputed to attend the camp.

F. C. ANDERSON,

Offg. Secy. to the Chief Commsr., Central Provinces.

Note.—The Deputy Commissioner is a Forest Officer for the purpose of this rule.

Mr. Gilbert then addressed the meeting. Having prefaced his remarks by observing that the rules were supplied to him directly he had applied for them, Mr. Gilbert said the part of the rules to which he chiefly objected was that relating to the payment of a fee of one rupee per day for each sportsman or *shikari* follower entering the reserve. There might be a difference of opinion as to what constituted a *shikari* follower, but he had communicated with one or two gentlemen in the Central Provinces, and they had stated that the definition applied to a common beater. This was very hard, and if the rules were strictly construed, he thought nearly every one would be unable to shoot in the Central Provinces. Of course, if sportsmen employed elephants, then they should pay a fee, for such animals did much harm to forests; but he quite failed to see why they should have to pay such fees for common beaters. He found on reference to Sir William Hunter's *Gazetteer of India* that the area of the Central Provinces was 113,279 square miles, and of this 17,131 square miles were unreserved forest, while 2,588 miles were reserved forest. The extent of the reserved forest land was constantly being added to by Government, and he had no doubt that since Sir William Hunter's book was written, it had increased by many thousands of miles. When he (Mr. Gilbert) was at Assirgurh last Christmas, he met a Forest Officer just at the edge of the jungle and was told that these rules were in force, but he did not say anything about the fees. He thought a great deal might be said in favour of having no rules whatever. But if, with reference to reserved forests, Government chose to have rules, he did not think sportsmen could reasonably object, provided permission could be easily obtained, and provided that the necessary licence was not arbitrarily witheld by those persons who had the benefit of the shooting in the districts for which application for licences was made. The power given to the District Officer was very great, but, so far as the Forest Officers were concerned, he had invariably received great assistance from them while out shooting, and he did not believe they would be unnecessarily arbitrary in dealing with the applications for licences. But still there was nothing said about an appeal to anybody if such licences were refused, and if a District Officer refused permission, there was no remedy whatever for the sportsman. In all the circumstances he would suggest that those present should form themselves into a Committee which should be authorised to draw up a petition on the subject for presentation to the Viceroy, asking that some or all of the rules should be withdrawn; further, that the Chairman should be authorised to sign the petition on behalf of the members.

Mr. W. Lee-Warner asked Mr. Gilbert if he knew for what object the rules had been issued. Was it to protect the forests from fire, or for the purpose of making a revenue?

Mr. Gilbert replied that he had not been able to ascertain the object with which the rules had been framed, but should imagine that they were issued partly for the protection of the forests and partly for the protection of game. They could not be solely for the protection of the forests, because in the rains there would be no danger as far as fire was concerned. Sportsmen who went out shooting were not likely to fire the forests. They had heard of instances of sportsmen lighting fires to get out of the way of animals, but the instances were far from numerous. The speaker also mentioned that he had in his individual capacity sent in a memorial to the Chief Commissioner, but it had not been replied to.

The Chairman observed that he did not think they had sufficient information at the present moment to justify them in taking any decided action in the matter. In his opinion all that they could do was to appoint a Committee to collect information on the subject, which could be submitted at a future meeting. He did not believe that the rules were framed for the purpose of protecting the forests from fire, because ample provision for such protection was made in the Forest Act VII. of 1878. In that Act there appeared to be three kinds of forests over which the Government exercised a certain amount of protection—namely, reserved forests, village forests, and protected forests—and he understood that the rules only applied to the first of these—reserved forests. He knew from experience that one could go through a vast tract of country in the Central Provinces without coming upon a reserved forest at all, but he believed that of late years—and this was a matter which they should inquire into—the policy of Government had been in the direction of turning large tracts of country into reserved forests, and probably a great many of these tracts had never even been placed under the category of protected forests. One of the first things they should do was to ascertain from the proper officials what particular forests in the Central Provinces had been declared to be reserved forests. His experience was that one always had to get leave to go into reserved forest, and from Section 25 of Act VII. of 1878 it was obvious that such permission must be obtained and it was also laid down that sportsmen should not allow cattle to trespass into the forests, that they could not take a horse into a reserved forest without permission, and that they were not to kindle or carry any fire except such as might be notified by the officer in charge of the forest. He could not therefore think that the rules were framed with the object of protecting the forests from fire, because this protection was already provided for, it being laid down that anybody lighting a fire so as to endanger a forest rendered himself liable to six months' imprisonment. What he objected in the rules was that they contemplated that one should not enter a forest at all, although his camp might be miles away from it, unless permission was obtained beforehand. The rules made it necessary that one should specify the exact time that he was going to enter the forest and the exact number of *shikari* followers that were going with him, while details also had to be given of every man, woman, and child who might be connected with the camp. This was impossible for any one to do. It was absolutely impossible for anybody at the commencement of a shooting trip to say how many *shikaris* should attach themselves to his camp. It was, in his opinion, good policy not to discourage any *shikari*, and he himself never dreamed of turning one of them away. If fees were to be charged, the rules should be so framed that they should be payable at the end of the trip, when one was in a position to give a proper return of the number of followers who had accompanied him. The rules, as they stood at present, seemed to lay it down that they were all dishonest, and accordingly they must pay the fees in advance. He did not see the necessity for fees at all. Of course, they would be to the advantage of rich men, because they would tend to lessen the shooting in the jungle: but for the great mass of sportsmen who had not succeeded in shaking the Pagoda tree, the fees were absolutely prohibitive, and some of them would have to give up shooting entirely if the rules were enforced. However, he did not think that they should attribute the framing of the rules to any desire on the part of forest officials to keep the shooting for themselves. It was only natural that the men in charge of the forests should like to get as much shooting as possible, but at the same time he might say that his experience taught him that the forest officials were "remarkably good fellows." Again, he did not believe the rules were framed to raise a revenue, because although the fees would fall heavily upon the individuals who had to pay them, the aggregate amount realised would be comparatively trifling. As a matter of fact, better shooting was obtained in the jungle, but it often happened that while a sportsman was shooting on the borders of a reserved forest the animal went into the forest itself: and under the present rule, if such a thing happened, the sportsman would have to abandon his pursuit, unless he had previously obtained permission to enter that particular forest, and it was very unlikely that he would be in the possession of such a permit. He certainly objected to being bound to give such minute details when applying for permission to enter a reserved forest, and he would say further that if permission was given at all, it should be given without the payment of any fees at all. As for having a Forest Officer in one's camp to "dry nurse" one, he should object, because if he was a friend of the officer in charge of the forest, he would consider he was doing his master a good turn by thwarting the efforts of the sportsman. In conclusion, he thought they should appoint a Committee to get information as to the particular forests to which the rules applied, and also as the reason why they were framed, and then they should consider whether the Chief Commissioner of the Central Provinces had power to levy fees for permission to enter the forests. He did not find any express power given to the Commissioner to make any rules with reference to reserved forests. The only provision made in the Act was for the punishment of persons who acted in contravention of any rules the Local Government might from time to time prescribe with reference to hunting, shooting, and fishing. There was, however, another section—31—in the Act which enabled the Local Government to make rules to regulate hunting, shooting, and fishing; but this applied only to protected forests. He might also point out that it had been ruled in more than one court, that where power to regulate was given, it did not mean power to prohibit. The Committee must first get accurate information, and then it might be considered if the legality of the rules could be questioned. If it could be questioned, the members would question it. If not, then they must take all possible steps to prevent the rules operating harshly upon the large number of sportsmen, who already found the ordinary expenses of shooting quite heavy enough for their pockets.

Colonel Major suggested that application might be made to have the rules held in suspension till the present season was over.

The Chairman thought that Colonel Major might submit a resolution to that effect.

Mr. Gilbert: Then you are not in favour of drawing up a memorial at present?

The Chairman: I do not think we have sufficient material to enable us to do so.

Mr. Gilbert: The Committee can get the material and then draw up the memorial.

The Chairman: I think we may empower the Committee to take such steps as they deem desirable after they secure the information.

Mr. Lee-Warner then moved the following resolution:—"That the Chief Commissioner be informed that the recent regulations for sport in the forests of the Central Provinces have been considered by this Society, and that he be invited to suspend the operation of them for the present season with a view of further consideration of their details ; at the same time he be invited to acquaint the Society with the principal objects with which the rules are framed, in order that the Society may co-operate to effect the policy of preserving the forests and the game which he has in view, without incurring the risk which they fear that the regulations in their present form involve of prohibiting all sport.'' Mr. Lee-Warner remarked that, although there were more important forests in Bombay than in the Central Provinces Government had not found it necessary to issue any such rules as had been issued by the Chief Commissioner. Some time since rules were made in the Kolhapore State to the effect that no one should enter the forests without permission, and they operated most injuriously, for when sportsmen were shooting in the jungles adjoining Kolhapore, they found themselves pulled up while following their animal by the village officers, who asked, "Where is you permission?" while the patels and other officers thought it necessary to throw every obstacle in their way. On it being represented to the Kolhapore State that the British Government imposed no rules, the authorities there at once withdrew their rules, and now they would always give permission to enter the forests.

Colonel Major seconded the resolution, and it was carried.

The Chairman next proposed, "That the Secretary of the Society be instructed to communicate this resolution to the Chief Commissioner, Central Provinces."

This was seconded by Mr. L. P. Russell and adopted.

Mr. Gilbert moved, "That on the receipt of a communication from the Chief Commissioner, the Secretary be authorised to call another meeting of the Society in order that the same may be considered, with a view, if necessary, to further action being taken in the matter.''

Captain Olivier having seconded the motion, it was agreed to.

The Honorary Secretary here stated that he had received letters on the subject from a large number of gentlemen residing up-country, including Colonel Coles, Captain Richardson, Mr. J. Davidson, C.S., Mr. Robert Wroughton, Captain Becher, R.A., Captain T. Macpherson, and General Anderson. These letters, he intimated' would be carefully considered by the Sub-Committee when appointed.

The proceedings then terminated with a vote of thanks to the Chairman.

An adjourned general meeting of the members of the Bombay Natural History Society was held on the 29th March 1889 at their Rooms in Apollo Street, Fort, for the purpose of considering a letter received from the Chief Commissioner of the Central Provinces, in reply to the Society's communication to sport in the Central Provinces.

Mr. Inverarity, who presided, called upon Mr. H. M. Phipson, the Honorary Secretary, to read the following letter received from Mr. Laurie, the Secretary to the Chief Commissioner of the Central Provinces, which letter was also accompanied by a list of rules framed for the protection of game in the above districts.

Camp, 23*rd of March* 1889.

The Honorary Secretary, Bombay Natural History Society.

Sir,—I am directed to acknowledge receipt of your letter of the 7th instant, with its enclosure, regarding the rules recently laid down by the Chief Commissioner for regulating hunting, shooting, fishing, &c., in the reserved forests of the Central Provinces.

2. The Chief Commissioner observes from the report of the discussion at the meeting of the Society on the 5th March, which you have forwarded for his information, that the main objection taken to the rules was the supposed incidence of the scale of fees. It had already come to Mr. Mackenzie's notice that there was misunderstanding upon this point; and as it never was his intention to throw unnecessary difficulties in the way of *bonâ fide* sport, he had, before your letter reached him, directed the preparation of an addendum to the rules as originally issued providing for the levy of reasonable fees upon term permits, and making it clear that beaters and camp followers did not come within the purview of the rules. These additional rules were published in the *Central Provinces' Gazette* of the 9th March, and I am to refer your Society to notification 1595 of that date. (Copy enclosed.)

3. This practically disposes of the difficulty raised at the meeting of your Society; but as the members are anxious to know the principal objects with which the rules have been framed, I am to communicate the following remarks for their information :—

4. The forests of the Central Provinces are, generally speaking, in a very backward and unsatisfactory condition. They have been seriously injured by indiscriminate felling during many generations, and require the most careful treatment and conservancy to restore them to anything like a healthy state. The efforts of the department to foster natural reproduction are, however, constantly frustrated by the occurrence of extensive fires, which are frequently no doubt kindled and spread by local graziers with a view to clearing the ground for fresh grass, but are ruinous to the young forest growth. Large sums are now spent annually on measures of fire protection in the more valuable blocks; and as funds become available and the local establishments are organized, the fire protected area will be year by year extended. The Chief Commissioner has within the last two years taken steps to impress upon owners of land near the Government forests their responsibility under the law for doing nothing to carry the risk of fire into or near the forests. But his efforts in this direction and the work of the forest establishments have frequently been frustrated by the breaking out of fires within the forest blocks themselves; and it is a fact that these fires have in more than one instance been coincident both as to time and place with the movements of shooting parties within the reserves. It may be that the sportsmen or their followers were not directly responsible for the mischief done, though a partially extinguished camp fire, or even the careless throwing away of a match or the end of a lighted cheroot, would, in these extremely dry districts, be enough to start a smouldering, which the least wind would fan into a fire beyond all human control. But the fact remains that if fire protective measures are to have any effect, the more valuable blocks must at certain seasons be absolutely closed to outsider, or admission must only be granted under close supervision and suitable restrictions. There are, however, thousands of square miles of reserves to which in their present state sportsmen may be admitted more freely; but experience has shown that it is everywhere desirable to know what persons are worrying about the forests at any given time, and this knowledge can only be secured by a system of permits.

5. I am to remind the Society that it is not only gentlemen of the status of its members who seek to exploit the game of the Central Provinces forests. They are infested by gangs of native shikarees from all parts of India, whom it is at present impossible to trace and identify in the event of enquiry being necessary regarding any of their proceedings. Government rules cannot discriminate between sportsmen of different nationalities or grades of society.

6. To the fees in themselves the Chief Commissioner attaches comparatively little importance. They constitute, however, a useful and simple check upon the entry of persons of a class which it is most difficult to control, while they are not so heavy as to be a serious tax upon any respectable sportsman, European or native. As to the right of Government to levy fees for permission to shoot in its forests, there can hardly be any serious question, if it is remembered that a reserved forest is merely permanent Government estate, in and over which all outside rights and easements have been extinguished or commuted by process of law, the whole produce of which (as forest produce is defined in the Act) is Government property, and trespass in which, if access is forbidden, is a punishable offence. Government already lets its fisheries, and the right to collect horns and hides. It has a perfectly indefeasible right, in the Chief Commissioner's opinion, to close any forest block to outsiders, or to say that it will admit them on any terms, pecuniary or other, which it chooses to prescribe. Nearly all the Government forests of the Central Provinces were declared reserves shortly after the the passing of Act VII. of 1878, and if large areas have hitherto been practically neglected, this has been due only to the weakness of the establishments and the impossibility of extending a strict conservancy to the whole or even any very great portion of them all at once.

7. But the rules have other objects besides the prevention of fires. As above explained, the forests of these provinces have for years been freely exploited by large numbers of native shikarees for trade purposes. Birds have been shot and snared for their feathers. The hinds, does, cows, and young of harmless game have been destroyed ruthlessly for their skins. Men of the class observe no close season, and numerous interesting and valuable species are now on the verge of extinction. The Chief Commissioner hopes by the system of permits in course of time, and as experience is gained, to do something to check this and put matters on a better footing. This, he feels sure, is an object in which he will carry with him the sympathy of the Bombay Natural History and of all true sportsmen. If the Society would communicate to him any information at its disposal regarding the proper close season of the different species of birds and game known in the province, he would welcome it. He finds much discrepancy and doubt existing on this question.

8. For the rest, the Conservator has been instructed to work the rules in a reasonable and liberal spirit, with due regard to the primary object which they have in view. Special facilities for the destruction of dangerous carnivora will be afforded as far as possible. Any temperate representations regarding the operation of the rules in individual cases or generally will always receive the Chief Commissioner's early attention. But as this year the province is suffering from a continued drought, and the forests are in a specially dangerous condition, Mr. Mackenzie must decline to suspend the operation of the rules as suggested by the Society. Any delay in giving effect to them might involve serious consequences. He is responsible to the Government of India for his management of the forests, and he must adopt on his own responsibility, and subject only to the control of the Governor General in Council, such measures as appear to him called for in the public interest. He can share that responsibility with no non-official person or society, though he is always ready to accept information and suggestions from such a body as you represent.

9. The only other point which it is perhaps desirable to notice is the exemption of Forest Officers from the necessity of taking out permits. The Chief Commissioner would have supposed the reasonableness if this would have been self-evident, but one of your members, he observes, takes exception to it in a letter to the *Bombay Gazette*

The officers whose duty it is to protect the forest and decide on the grants of permit to outsiders (including all other Government officers from the Chief Commissioner downwards) could hardly be called upon to issue permits to themselves. The Deputy Commissioner is in these Provinces, owing to the paucity of the trained staff, in charge of large areas of the district forests, and can fairly claim exemption a himself a Forest Officer. No other exemption in favour of officials is permitted Any Forest Officer found protecting or preserving the shooting in a forest for his own purposes would, the Society may be sure, be very severely dealt with.

I am, &c.,

L. K. LAURIE,

Offg. Secretary to the Chief Commissioner, C. P.

Mr. Gilbert considered that as the Chief Commissioner had expressed willingness to listen to any suggestions the Society was prepared to make, it would be advisable to appoint a Committee of the members to reply to it. He should personally like to make a few suggestions, and he had also a number of letters from friends which contained suggestions, that he considered might be submitted to the Commissioner.

Mr. Inverarity, on the other hand, considered that as the letter they had received contained a very satisfactory reply to their communication, it was not advisable to make any suggestions, as the scale of charges was, as modified, moderate enough to satisfy any true sportsman, and should not raise any complaint, for, as far as he could see, the rules would prevent what he called the "native pothunters" from shooting anything they met. He, furthermore, understood from the letter that it was simply intended to enclose certain areas in order to protect them from fire. He believed that was always done, and as the areas so enclosed were not very large, he did not think it would much matter. For, as far as the Society was concerned, he did not think they had much ground for complaint, as the rules would tend to the protection of game and the expulsion from the shooting ground of that class of native shikar who shot indiscriminately at small game and over water, regardless of a proper close season. He considered such shooting should be prohibited during the hot months. He did not see how the Society could make any suggestions to the Commissioner regarding the working of the rules for they had done all that was necessary in the matter. He therefore suggested that the Secretary of the Society be instructed to reply to the Commissioner's letter, thanking him for the courteous answer he had given to the Society's communication, and expressing their gratification that the Chief Commissioner's rules are not intended to restrict sport in the Central Provinces.

This proposition, on being seconded by Mr. Taylor, was carried *nem con.*, the proceedings concluding with the customary compliment to the Chairman.

No. 1505.—The Chief Commissioner is pleased, under Section 25 (i) of Act VII. of 1878 (the Indian Forest Act), to add the following Rules to those published in Notification No. 6925, dated the 29th November 1888.

VI.—Permits for shooting only may be granted at the periodic rates specified below, instead of at the daily rates payable under Rule V :—

Period.	Periodic rates.								
	For each sportsman or shikari follower.			For each elephant taken into the Reserved Forest.			For each camel taken into the Reserved Forest.		
	Rs.	a.	p.	Rs.	a.	p.	Rs.	a.	p.
From the 1st July in any one year to the 31st October in the same year	5	0	0	5	0	0	5	0	0
From the 1st November in any one year to the end of February in the succeeding year	25	0	0	5	0	0	5	0	0
From the 1st March in any one year to the 30th June in the same year	50	0	0	5	0	0	5	0	0
For one month within the period from the 1st July to the 1st October as above ...	2	8	0	2	0	0	2	0	0
For one month within the period from the 1st November to the end of February as above	7	8	0	2	0	0	2	0	0
For one month within the period from 1st March to the 30th June as above	15	0	0	2	0	0	2	0	0

N. B.—(*a*) A charge for the pay and allowances of a Forest Subordinate, as provided by Rule V. (3), will also be made when camping in the reserves is allowed.

(*b*) The charge provided by Rules V. and VI. for elephants and camels will only be made in the event of camping within the Reserved Forests being allowed.

VII.—For specific purposes and in special cases permits may, with the previous sanction of the Conservator, be granted without charge.

VIII.—Nothing in the preceding rules shall debar the disposal by auction-sale, contract, or otherwise of the fishing or shooting within any Reserved Forests or portion of a Reserved Forest.

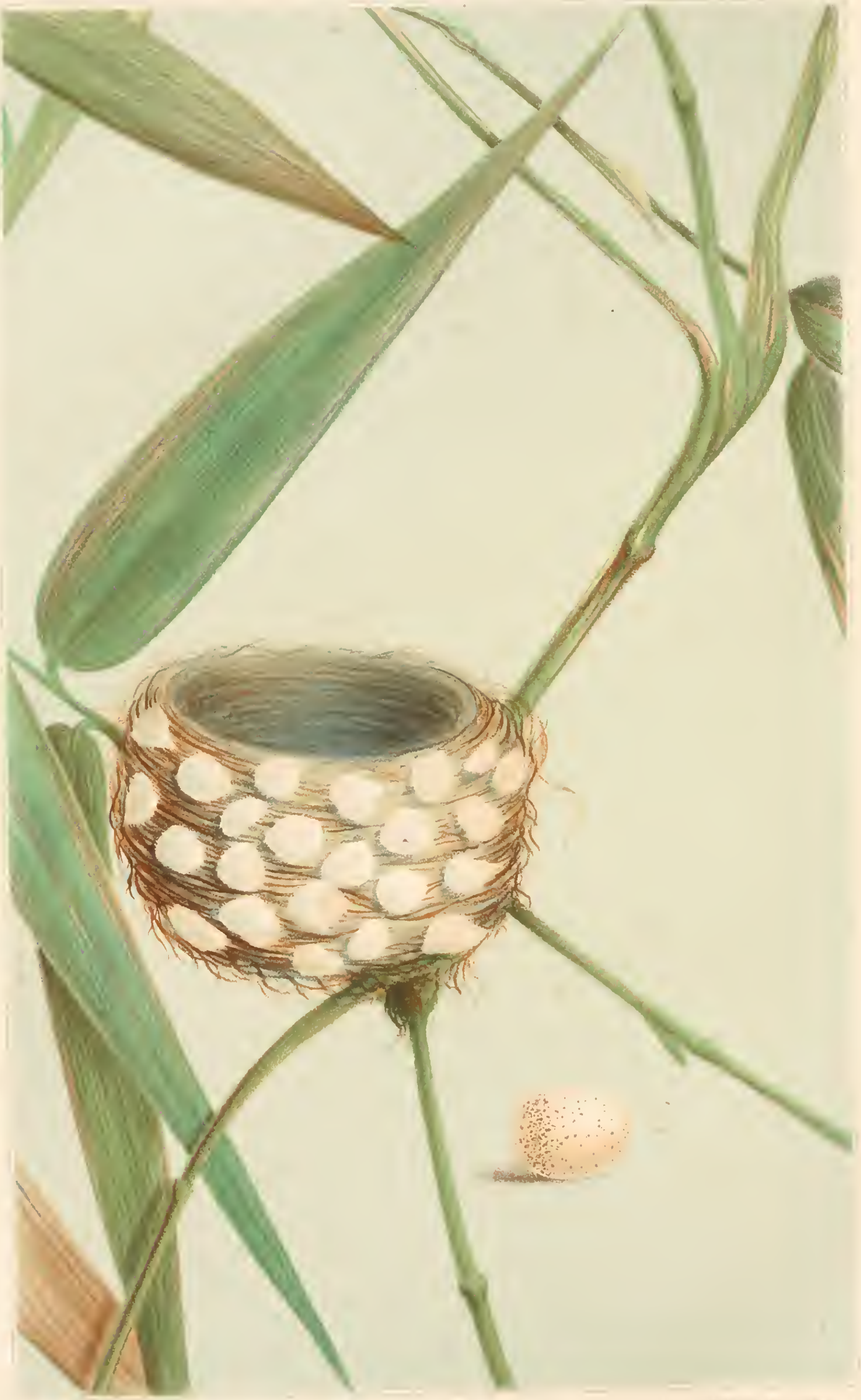
Explanations.

(*a*) Shikari follower in these rules means a person who is taken into the Reserves for the purpose of killing or catching game, and is not merely an attendant on the holder of the permit. The intention is that each "effective gun" of the party should pay the fee. Persons employed by the holder of a permit in tracking, marking down, or beating for game (where this is allowed) are not Shikari followers within the meaning of Rules V. and VI.

(*b*) The holder of a permit is allowed to remove from the forest any game shot by him.

(*c*) Shooting will not ordinarily be allowed within "fire protected forests" during the hot season.

L. K. LAURIE,
Offg. Secy. to the Chief Commr.,
Central Provinces.



H. B. del.

Mintern Bros. Chromo lith. London.

290. HYPOTHYMIS AZUREA, Bodd.
The Black-naped Blue Flycatcher

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NESTING IN WESTERN INDIA.

(*Continued from page* 21.)

226.—THE VIOLET-EARED RED HONEYSUCKER.

Æthopyga vigorsi, Sykes.

This beautiful bird occurs all along the Ghats, straying from there a little in the cold weather ; it is very common at Khandalla, where it is a permanent resident, breeding during the latter part of the rains, making a hanging nest, a great deal larger than that of the Common Purple Honeysucker. Mr. Davidson says that in the only two cases in which nests came to his notice, they contained three eggs and three young respectively. The eggs resembled those of the Amethyst Honeysucker, but were considerably larger, and had a hair line round the larger end, such as is common in some of the Wagtails.

232.—THE AMETHYST HONEYSUCKER.

Cinnyris zeylonica, Lin.

This is the common Honeysucker of the Deccan, and is very abundant at and near Bombay. Mr. Davidson says that an immature specimen was named by Mr. Hume from a lot of *Cinnyris asiatica* sent by him from Khandesh, but that he personally never identified one from there, and that even in the Nassick district he never noticed it further east than Nassick itself, and that similarly in Sholapur it did not come further east than Pandharpur.

It probably breeds twice or oftener during the year, as nests are found at all seasons, but September is perhaps the best month to search for them.

A capital description of the nest is given by Mr. Vidal, C. S., in his *Ratnagiri Birds*, published in the *Bombay Gazetteer* for 1880, which I cannot do better than reproduce:—

"Their nests are beautiful, hung from the slenderest twigs, and rocked to and fro by every breath of wind. The nest is pear-shaped, narrowing in the middle, with a side entrance shaded by a tiny overhanging porch. The materials are the finest grass lined with soft down, and the nests are on the outside prettily decorated with chips of wood, spider webs, dried flowers, cocoons, and anything else that pleases the fancy of the diminutive architects. They lay two, occasionally three, tiny greenish-white eggs, speckled with minute brown spots. The Jujube tree (*Zizyphus jujuba*) is a favourite place for the nest, but they are very fearless, often building in verandahs and house porches." Mr. Davidson observes that they very rarely lay three eggs ; I myself never found more than two.

The eggs measure 0·65 inches in length, by about 0·47 in breadth.

Dadur, &c., Bombay, August and September. *H. E. Barnes.*
South Konkan, Jan., March, April, September. *G. Vidal, C.S.*

233.—THE TINY HONEYSUCKER.

Cinnyris minima, Sykes.

The Tiny Honeysucker occurs on the Sahyadri range, extending as far north as Khandalla. It is not uncommon at Matheran. It is a permanent resident, breeding during September and October. The nest is pendant, of an oval shape, very similar to that of the Purple Honeysucker, but smaller. The eggs, two in number, are longish ovals in shape, and are of a greyish or greenish-white colour, freckled and mottled with greyish and olive-brown ; the markings are generally thicker at the large end, forming a cap or zone. They measure 0·62 inches in length by about 0·42 in breadth.

I have never found a nest, and the eggs in my collection came from the Nilgiris, but Mr. Davidson found a nest containing a young one just hatched at Matheran in February, and remarks that the nest was made of green moss.

234.—THE PURPLE HONEYSUCKER.

Cinnyris asiatica, Lin.

This Honeysuker is generally distributed throughout Western India, but is much more common in the North, where, indeed, it is the only representative of the genus. They commence to breed early in March, and nests may be found quite up to the beginning of the rains. The nest is pendant, shaped something like a florence flask, or oval with a tapering neck. This is suspended from the tip of a slender branch or twig. All sorts of materials are made use of in constructing the nest: fibres, cobwebs, hair, fine grass, bits of straw, lichens, dead leaves, dried flower petals, pieces of rags, &c., are all used, and are neatly and compactly woven together. It is well lined with soft vegetable down. The nest at a short distance resembles one of the bunches of cobwebs, so commonly met with on trees and bushes.

The entrance, which is on one side, about half way up, is shaded by a canopy, beautifully adapted to keep out the rain. It is worthy of notice that in Sind, where the rainfall is scanty, this canopy is altogether absent, or only just indicated. The eggs, two or three in number, are dingy little ovals; the ground colour is greenish or greyish white, usually almost obscured by greyish-brown or greyish-purple ill-defined markings.

They average 0·64 inches in length by about 0·46 in breadth.

The nests are too common to need detailed dates.

The nest is occasionally found in the centre of a large dusty cobweb; and would escape detection, were it not for the fussy habits of the parent birds.

235.—THE LARGE PURPLE HONEYSUCKER.

Cinnyris lotenia, Jerd.

Within our limits this is the least common of all our Honeysuckers. It appears to be restricted to the Ghats and adjacent forests; it also occurs sparingly in the neighbourhood of Bombay, where Mr. E. H. Aitken found it breeding in his garden in November. Of this an account was given at p. 52, No. 1, Vol. II., of the *B. N. H. S. Journal.* He describes the nest as very similar to that of *Cinnyris zeylonica,* but much longer, measuring quite ten inches. Unfortunatly he delayed taking the nest, which, on examination, was found to contain one young one and a much incubated egg.

This was of a dirty brownish-white ground colour, the smaller end being thickly covered with dull-brown spots which passed into larger confluent blotches and formed a cap at the larger end; he does not give the size of the eggs.

Oorun, Bombay, November. *E. H. Aitken, B. A.*

238.—TICKELL'S FLOWER-PECKER.

Dicæum erythrorhynchus, Lath.

This Flower-Pecker is not uncommon all along the Sahyadri range and in the forests adjacent; it occurs also at and near Baroda. It has not as yet been recorded from Abu, but doubtless occurs there, having probably been overlooked on account of its diminutive size, plain colours and arboreal habits. It is a permanent resident, breeding during March and April, making an egg-shaped nest composed of soft silky down and vegetable fibres, which is suspended by its smaller end to a twig; it is often well concealed by leaves. The eggs, two or three in number, are pure glossless white, of a narrow oval shape, measuring 0·64 inches in length by about 0·42 in breadth. Mr. Davidson says, that "this bird appears to me to be a western form; I only got it sparingly close to the extreme west of the district. In Nassick, due south of this, it was very common in the western talookas, but rare or absent in the east."

W. Nassick, February, March, and April. *J. Davidson, C. S.*
Khandalla, April. *H. E. Barnes.*
Baroda. *H. Littledale, Esq.*

239.—THE NILGIRI FLOWER-PECKER.

Dicæum concolor, Jerd.

Within our limits this bird seems to be confined to the extreme south-east. It is probably a permanent resident.

240.—THE THICK-BILLED FLOWER-PECKER.

Piprisoma agile, Tick.

The Thick-billed Flower-Pecker has been recorded from Ratnagiri; it is rare in West Khandesh, but is common in all the western districts of Nassick. and therefore most probably occurs more or less commonly throughout the Sahyadri range. It crops up again at Baroda. Jerdon records it from the Deccan and the Malabar Coasts. They are, I believe, permanent residents wherever found, breeding during March and April, making a beautiful bag-shaped nest, hung over a twig, at a short distance from the end; the entrance hole is in front, at right angles to the twig, never in the side. The materials composing it are soft, fluffy vegetable down, spider webs, and flower petals, firmly felted together; it is very soft and pliable, and is of a dull uniform pinkish colour. I have never seen any other type than this, but my experience is not a very extensive one, being confined to Saugor, C. P., where the bird is common, and where I have taken many nests. The nest, although so neat and compact, does not take long to make. I watched a bird with a small piece of spider's web in its beak, and it stuck it above my head on a twig— in fact, I saw the foundation laid. The next day at about the same hour the nest was shaped, and on the fourth day the first egg was laid. The eggs, three in number, are longish ovals, measuring 0·63 inches in length by 0·4 in breadth; in colour they are rosy-pink, streaked, blotched, and speckled with claret and brownish-pink; the markings are usually much more numerous at the larger end. Occasionally the ground colour is white, but the markings are the same. Twice I have found a pure white egg in the nest, with two others of the usual colour.

Baroda, May.	*H. Littledale, Esq.*
Nassick, End of February, March, April.	*J. Davidson, C. S.*
Saugor, C. P., 18*th Feb.* to 10*th May.*	*H. E. Barnes.*

253.—THE VELVET-FRONTED NUTHATCH.

Dendrophila frontalis, Horsf.

This beautiful Nuthatch occurs in the most southern portion of the district, where it is very rare. Mr. Davidson says that it is not uncommon in the Dangs and broken country west of the ridge of the Ghats in Nassick. I can find no record of any eggs having been taken within our limits; the eggs in my collection were taken on the Shevaroy hills, still further south.

They are broadish ovals in shape, measuring 0·67 inches in length by about 0·55 in breadth, and are white speckled and blotched with rusty red.

Shevaroy Hills, March.	*W. M. Daly, Esq.*

255.—THE INDIAN HOOPOE.

Upupa ceylonensis, Reich.

The Indian Hoopoe is a common permanent resident in the Deccan and southern portion of the district generally, becoming much less common further north, where it occurs only as a visitant; it has not as yet been recorded from Sind. It breeds during March, April, and May in holes in trees, in banks and in walls, making little or no nest; the eggs, from five to seven in number, are rather narrow ovals pointed at one end, measuring 0·97 inches in length by 0·66 in breadth; they are pale greyish blue when fresh, but become darker and dingier as incubation proceeds. The beaks of the nestlings when first hatched are short, and it is interesting and amusing to watch the rapid growth.

A specimen shot by me at Saugor has a bill 3·46 inches long at the gape, or about an inch longer than usual.

Poona, March. *H. E. Barnes.*

Sholapur, April and May. *J. Davidson, C. S.*

256.—THE INDIAN GREY SHRIKE.

Lanius lahtora, Sykes.

The Grey Shrike is a common permanent resident throughout the greater portion of Western India; it is less common in the south-west, and appears to be altogether absent from Ratnagiri. It breeds from February to July, making a deep cup-shaped nest in a fork in a small tree or bush, generally a thorny one. The materials composing it are various, almost anything and everything being made use of. The eggs, usually four in number, occasionally five or six, are broadish ovals, pointed at one end, measuring 1·03 inches in length by 0·79 in breadth; the ground colour is a very pale greenish-white (sometimes pale stone), spotted and blotched with different shades of brown and purple; the markings are often most numerous at the larger end, forming an irregular gap or zone.

Sholapur,
Nasik, } *Feb. to March, and June and July. J. Davidson, C.S.*
Khandesh,

Deesa, Neemuch, &c., Feb. to July. *H. E. Barnes.*
Hyderabad, Sindh, March to May. „
Baroda, April to July. *H. Littledale, Esq.*

257.—THE RUFOUS-BACKED SHRIKE.

Lanius erythronotus, Vig.

The Rufous-backed Shrike is a common permanent resident throughout the greater portion of the district, breeding from March to August, or even earlier. The nest is very similar to that of the Grey Shrike, but is smaller; the eggs, five or six in number, are broad ovals in shape, pinched in at one end; they average 0·92 inches in length by 0·7 in breadth; the ground colour is a very pale pinkish stone, but is subject to much variation. They are spotted and blotched with purplish and pale-brown. Mr. Davidson informs me that this bird does not breed in the Sholapur district, though it is a common breeder in Satara, Nassick, and Khandesh.

Hyderabad, Sind, May to July.	*H. E. Barnes.*
Neemuch, &c., &c., June to Aug.	,,
Baroda, May to July.	*H. Littledale, Esq.*

260.—THE BAY-BACKED SHRIKE.

Lanius vittatus, Val.

The Bay-backed Shrike is a very common permanent resident throughout the greater portion of the district, but like the last is much less common in the south. They breed from May to August, making a neat, compact, cup-shaped nest composed of grass stems, roots, &c.; it is usually placed in a fork in a small tree, but occasionally at the junction of a large branch with the trunk. The eggs, four in number, sometimes five or six, are broad ovals, pinched in at one end, and average 0·83 inches in length by 0·65 in breadth.

The ground colour is pale brownish-stone, or pale-creamy, feebly speckled and spotted with brown and purple. The markings occasionally form a ring round the larger end.

Poona, May to July.	*H. E. Barnes.*
Hyderabad, Sind, June to Aug.	,,
Neemuch, March to July.	,,
Nassick and Khandesh, March to July.	*J. Davidson, C. S.*
Baroda, March to June.	*H. Littledale, Esq.*

265.—THE COMMON WOOD SHRIKE.

Tephrodornis pondicerianus, Gmel.

The Common Wood Shrike is very abundant in all suitable localities in the district: it is a permanent resident, breeding from the latter end of February to May, making a compact cup-shaped nest, composed of grass roots and fibres bound together with spider webs; it is placed in a fork in a tree; occasionally in a bush. The eggs, three in number, rarely four, are broadish ovals in shape, measuring 0·75 inches in length by 0·6 in breadth. In colour they are greenish-white or creamy-stone, thickly spotted and blotched with yellowish- and reddish-brown, with occasional underlying patches of pale inky purple ; the markings are usually more numerous at the larger end.

Hyderabad, Sind, April.	*H. E. Barnes.*
Konkan, February.	*G. Vidal, C.S.*
Nassick, March and April.	*J. Davidson, C.S.*
Khandesh ,,	,,
Baroda, March.	*H. Littledale, Esq.*

267.—THE LITTLE PIED SHRIKE.

Hemipus picatus, Sykes.

The Little Pied Shrike is rare, and is apparently confined to the Sahyadri range. It has been recorded from Savantwadi, in the Southern and Western Khandesh, in the northern parts of these hills.

Mr. Davidson writes as follows :—"This little Shrike is not uncommon in the Satpooras (Khandesh), but is, in my experience, rare in the Ghats. I took a nest just under the crest of the Ghats, in West Nassick, on the 25th May 1887. The nest was on the upper side of a horizontal branch of a tall silk cotton tree, near the tip of the branch. It was a large pad of moss, bound round and to the branch with spider webs, and was lined with fine grass. It is the shallowest nest I have ever seen. The eggs were miniatures of those of the Common Wood Shrike."

268.—THE BLACK-HEADED CUCKOO SHRIKE.

The Black-headed Cuckoo Shrike is absent altogether from Sind, and is very rare at Abu, but becomes more common further south. It is a permanent resident, but wanders about a good deal during the cold season. It breeds from June to August, making a shallow nest, composed of thin twigs and grass roots bound together with spider webs. The eggs, three or four in number, are longish ovals, pointed at one end, measuring 0·85 inches in length by 0·66 in breadth ; they are pale-greenish white in colour, boldly marked with spots and streaks of brown.

Wassind, Bombay, July.	*H. E. Barnes.*
Baroda, June and July.	*H. Littledale, Esq.*
Dhulia, W. Khandesh, June and July.	*J. Davidson, C.S.*

270.—THE LARGE CUCKOO SHRIKE.

Graucalus macii, Less.

The large Cuckoo Shrike is rare in the northern portion of the Presidency, but is more common towards the south. It breeds at various seasons in different parts of the country, and may perhaps have two broods in the year. The nest is placed high up in a thick fork, or on a horizontal branch in a lofty tree, and is of a shallow cup shape, composed of thin twigs, grass bents and moss, bound together with spider webs. The eggs, two or three (often only one) in number, are longish ovals, of a pale-greenish stone colour, streaked, spotted, and blotched with brown, with underlying clouds, of pale inky-purple. They average 1·22 inches in length by 0·9 in breadth.

S. Konkan, February and March.	*G. Vidal, C.S.*
Saugor, C. P., May to August.	*H. E. Barnes.*
Baroda, August to October.	*H. Littledale, Esq.*
Nassick, May.	*J. Davidson, C.S.*
Khandesh, August.	,,

272.—THE ORANGE MINIVET.

Pericrocotus flammeus, Forst.

The Orange Minivet is a permanent resident, and is not uncommon, all along the Sahyadri range, from the extreme south of the Presidency, to as far north as the hills in Khandesh. It does not occur in the plains.

It breeds during June, July, and August, making a small compact nest, composed of fine twigs and grass roots, covered on the exterior with small lichens ; it is neatly and compactly built. It is a difficult nest to find, being placed in a fork in a slender bough, at some height from the ground. I have been unable to procure any eggs, as the only nest I have ever found was unfinished. I intended returning a week or so later, but was prevented by illness. The eggs are said to be of a pale-greenish ground colour, streaked and spotted with yellowish-brown.

Khandalla, 31st July. *H. E. Barnes.*

276.—THE SMALL MINIVET.

Pericrocotus peregrinus, Lin.

The small Minivet is generally distributed throughout Western India, wherever there are high trees. It is a permanent resident, breeding at the commencent of the rains.

The nest is a compact neat little cup, composed of fine twigs and fibres, highly ornamented with bluish-grey lichens and small flakes of bark, bound together with spider webs; it is usually placed in a slender fork, sometimes on a horizontal bough. The eggs, three in number, are broadish oval in shape, measuring 0·67 inches in length by about 0·52 in breadth. In colour they are greenish or pinkish-white, profusely marked with bright brownish-red spots and blotches, with an occasional underlying spot of faint inky-purple.

277.—THE WHITE-BELLIED MINIVET.

Pericrocotus erythropygius, Jerd.

The White-bellied Minivet is altogether absent from Sind, and does not appear to have been recorded from Ratnagiri; in most other parts of the Presidency it occurs as a more or less rare straggler. It is much more common in Khandesh, as the following note by Mr. Davidson will show:—

"This is the minivet of the barren scrub-jungle that grows on the rocky hills in Khandesh and Nassick, and there this bird is very common. I have noticed it also in the Satpooras. It breeds in low bushes all through the scrub-jungle in July, August, and September, laying invariably three eggs, long shaped, often olive green, with longitudinal spots on them."

The eggs in my collection, received from this gentleman, are broadish oval in shape, and are very pale greenish-white in colour, profusely streaked longitudinally with clayey-brown.

278.—THE KING CROW.

Buchanga atra, Herm.

The King Crow, or Common Drongo Shrike, occurs throughout the district; it is a permanent resident, breeding from May to August, but nests are occasionally found both earlier and later. The nest is usually placed in a fork of a tree at some height from the ground, and is composed of grass stems and roots neatly and compactly woven together, but so thin at the bottom that the contents are easily seen from below. The eggs, four in number, are of three distinct types, the most common being pure white, with spots and specks of reddish and blackish-brown; another, almost as common, has the ground colour a pale salmon, richly spotted and blotched with rich brownish and purplish-red. The third type (which I have only met with in the Central Provinces) is a pure glossless white, quite devoid of markings. They are oval in shape, somewhat pointed at one end, measuring about an inch in length by three-quarters in breadth.

280.—THE LONG-TAILED DRONGO.

Buchanga longicauda, Hay.

The Long-Tailed Drongo occurs on the Sahyadri range, where it is a permanent resident. Mr. Davidson procured it in Khandesh, but I do not think that it breeds in that district; it is altogether absent from the northern half of the Presidency, or only occurs as a very rare straggler.

They breed during May and June, making a neat cup-shaped nest of grass and fibres, bound together on the exterior with cobwebs; it is usually placed in a slender fork in a tree at some height from the ground. The eggs, three or four in number, are similar in shape to those of the Common King Crow, but are usually much more highly coloured, and average rather smaller.

281.—THE WHITE-BELLIED DRONGO.

Buchanga cærulescens, Mull.

So far as I know, Mr. Davidson, C. S., is the only ornithologist that has procured the eggs of this bird, and he has kindly furnished me with the following note:—

"This bird wanders all over the Presidency in the cold weather, as I have found it everywhere, even in Sholapur at that season. It leaves for the hills early in the hot weather, and breeds, so far as I am able to judge, always in March and April, and not as one would naturally expect, in the rains. According to my experience, it only breeds in thick jungle among the hills. The eggs, three in number, are pinkish, spotted, and blotched at the thicker end with purple. They are rather smaller than those of *Buchanga atra*, and more resemble those of *Buchanga longicauda.*"

Akrani, Khandesh,	*April (fledged young).*	*J. Davidson, C. S.*
W. Kalwan, Nassick,	*March and April.*	,,
W. Bagla, Nassick,	*May (young).*	,,

282.—THE BRONZED DRONGO.

Chaptia ænea, Vieill.

The distribution of the Bronzed Drongo, in the Western Presidency, is similar to that of the Long-tailed Drongo, but it appears never to descend to the plains. It is said to be a permanent resident in the Ghats, but I can find no record of a nest having been found within our limits. Elsewhere they breed about March, making a broad saucer-shaped nest, composed of fine twigs and grass, which is placed in a slender horizontal fork, to which it is attached by vegetable fibres and cobwebs ; pieces of lichens and small cocoons are often used to ornament the nest. The eggs, three or four in number, are obtuse ovals in shape, of a fawnish-white ground colour, blotched with fawn and reddish-brown, principally at the larger end ; occasionally they are white, with a few reddish-brown specks. They average 0·91 inches in length by about 0·65 in breadth.

285.—THE MALABAR RACKET-TAILED DRONGO.

Dissemurus paradiseus, Scop.

The following note from Mr. Davidson, C. S., is all the information I can collect regarding the nidification of this handsome bird : "This is a forest bird, very common in the forests of Kanara and in the Dangs (the hilly country west of Nassick). I have noticed it also in the cold weather in the plains forest near Taloda, in West Khandesh. It makes a largish nest near the top of a high tree in jungle, and lays two or three eggs, of the same type as those of *Buchanga longicauda*, but larger and much more highly coloured, some specimens being blotched all over with purple and pink of various shades"

Dangs, W. Nassick, May and early in June. J. Davidson, C.S.
Kanara, May. ,,

287.—THE ASHY SWALLOW SHRIKE.

Artamus fuscus, Vieill.

The Ashy Swallow Shrike has been recorded by Mr. Vidal from Ratnagiri. He remarks : "Not uncommon in the cocoanut gardens." Mr. Davidson found it to be common in the cocoanut gardens in Kanara, and also in the Panchmahals, in Gujarat. I procured it at Elephanta in May, where it was breeding. The first nest I found was situated in the crown of a palmyra between the leaf stems ; another was in a hole, half way up a palm tree. I was unable to climb the tree myself, and unfortunately could not induce anyone else to do so. A specimen I shot had the testes very much enlarged, so this must be the breeding season.

The eggs have been described as white with a greenish tinge, having large brown blotches at the larger end; another type is creamy white, with a broad ring of pale yellowish-brown spots, and clouds and specks of very pale lilac at the larger end. They average 0·95 inches in length by about 0·71 in breadth.

288.—THE PARADISE FLYCATCHER.

Muscipeta paradisi, Lin.

With the exception of Sind,* where it is very rare, the Paradise Flycatcher occurs more or less commonly throughout the Presidency, but retires to the hilly and more wooded portions to breed during the hot season. The nest is a very handsome one, cup-shaped, and is composed of fine grass, fibres, moss, &c., firmly bound together with cobwebs, and ornamented on the outside with small white silky cocoons. It is seldom more than about one-quarter of an inch thick, except perhaps at the bottom. A favourite place for it is a pendant bamboo spray at a point where a few twigs spring up perpendicularly, some of these being incorporated with it. I have found them in similar positions on the outer branches of mango trees; occasionally it is placed in a fork, when it assumes the shape of an inverted cone. The birds appear to breed in both phases of plumage, sometimes one bird is chestnut and the other white; at others both are chestnut. At Abu, where the birds are common, I never saw one in the white plumage, but at Saugor, in Central India, the white ones were most numerous. The eggs are usually four in number, but I have found three much incubated, and Mr. Littledale once found five; but this is, I think, a most unusual number; they are oval in shape, somewhat pointed at the small end, and measure 0·82 inches in length, by about 0·61 in breadth. The ground colour is pinkish-white, sparingly dotted with brick red; these spots often form a cap or zone at the large end; some of them much resemble warm-coloured eggs of the Common King Crow, but are of course much smaller.

Neemuch, June.	*H. E. Barnes.*
Saugor, C. P., May, June and July.	,,
Baroda, May, June and July.	*H. Littledale, Esq.*
Mysore, May and June.	*J. Davidson, C. S.*

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*A specimen was shot at the Munchur Lake, and I obtained another at Hyderabad, Sind. These are, I believe, the only recorded instances of its occurrence in that Province.—H. E. B.

290.—THE BLACK-NAPED BLUE FLYCATCHER.

Hypothymus azurea, Bodd.

The Black-naped Blue Flycatcher occurs more or less commonly all along the Ghats, descending at times to the adjacent forest tracts; it is very common at Khandalla, where it is a permanent resident, breeding during June and July. The nest is usually placed in a small fork on the outside of a tree, at a moderate height from the ground; it is a deep massive cup, composed of grass stems, roots and moss, compactly woven together, and lined with fine grass. It is coated on the outside with cobwebs, with which small pieces of lichens, dead leaves, and cocoons are incorporated. Mr. Davidson, C.S., who found several nests in July on the Ghats in Khandesh, thus describes the nest :—"It is a very beautiful structure, a deep cup, generally attached to the side of a single hanging twig. Its sides are beautifully ornamented with the white nest of some spider, the pattern being so regular in some cases as to resemble lacework."*

The eggs, four in number, are oval in shape, measuring 0·68 inches in length by about 0·53 in breadth. The ground colour varies from white to buffy or salmon-pink, and they are speckled and spotted with red and reddish-pink, with an occasional spot of pale-purple. They are very variable both in size and colour.

Khandesh, June, July and August.	*J. Davidson, C. S.*
Khandalla, June.	*H. E. Barnes.*

292.—THE WHITE-BROWED FANTAIL FLYCATCHER.

Leucocerca aureola, Vieill.

The White-browed Fantail is common throughout the region, excepting Ratnagiri and the more hilly and wooded tracts, where it is replaced by the next species. It is a permanent resident, and breeds from February to August, but March and July are the months in which most eggs are to be found. They have at least two broods in the year, and, if undisturbed, use the same nest for the second brood. The nest is usually placed on the upper surface of a horizontal bough, and is difficult to find, as it appears to be a mere excrescence on the branch, with which it assimilates in colour. In shape it is a rather deep cup, about one and a quarter of an inch in diameter, and rather more than an inch in depth. It is rarely more than one-quarter of an inch thick. It is generally composed of fine grass and vegetable fibres, coated on the outside with spider webs. After their eggs are laid, these little birds become very courageous, darting out and attacking any birds that approaches the nest, no matter how large. The eggs, three in number, are broad ovals in shape, and vary from white to dingy creamy-white or pale-yellowish-brown in colour, with a belt of greyish-brown and faint inky-purple spots round the large end. They average 0·66 inches in length by 0·5 in breadth.

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* The nest figured was taken by Mr. Davidson at Khandesh.—H. E. B.

Neemuch, February to August. *H. E. Barnes.*

Too common to need further details.

293.—THE WHITE-SPOTTED FANTAIL FLYCATCHER.

Leucocerca leucogaster, Cuv.

The White-spotted Fantail Flycatcher is found in various parts of the Deccan, and is very common in the neighbourhood of Bombay, also at Ratnagiri, and again at Abu. Generally speaking, this bird replaces the preceding in hilly and well-wooded tracts. It has not been recorded from Sind. It is a permanent resident, breeding from March to July and even later. The nest is placed in a fork, in some low thick bush, generally a couranda or in a mango or other tree, at some height from the ground. The nest is composed of the same materials as the last, and resembles it in appearance, but a few straws are left hanging from the bottom, giving the nest an unfinished appearance. The eggs, three in number, are broad ovals in shape, of a buffy-white colour, with a zone of lavender and brownish spots towards the larger end. They measure 0·67 inches in length by about 0·52 in breadth, but are subject to much variation.

Abu, March and April.	*H. E. Barnes.*
Bombay, March to July.	”
Baroda, July.	*H. Littledale, Esq.*
Khandesh, May to July.	*J. Davidson, C. S.*
Nassick, June to July.	”
Satara, June.	”

306.—TICKELL'S BLUE REDBREAST.

Cyornis tickelli, Bly.

Tickell's Blue Redbreast does not occur in Sind, but has been recorded as more or less rare from all other portions of our district.

It is a permanent resident in the hilly and wooded tracts, but is merely a cold weather visitant elsewhere. They breed at the end of the hot weather or the commencement of the rains, making a compact, cup-shaped nest, composed of grass and leaves, lined with fine grass, which is placed in hollows in banks, or between the roots of trees, sometimes in crevices or niches in old walls. The eggs, three or four in number, are oval in shape, measuring 0·76 inches in length by 0·56 in breadth. In colour they are dingy greyish-white, closely freckled and mottled with reddish brown; some of them are so thickly marked that they appear to be dingy olive-brown throughout.

Nassick, June to August.	*J. Davidson, C. S.*
Khandesh ,,	,,
Saugor, C. P., May and June.	*H. E. Barnes.*

ROUGH NOTES OF TRAVEL AND SPORT IN KASHMIR AND LITTLE THIBET.

Under the above title, Professor H. Littledale, of Baroda, has printed for private circulation a very graphic and amusing account of his experiences while in search of sport, on the northern side of the Himalayas, in 1888.

We have been allowed to make the following extracts, the first of which will give our readers some idea of the competition which exists between sportsmen, in order to secure the most favourite shooting ground,—in this case, Dutchkut nullah in Little Thibet.

March 26th.—Marched from Cheelan *viâ* Dars and Kerrim to Godhaie. At first no road; snow very heavy; floundered waist-deep for some miles. Below Kerrin snow light and path fairly good. Dined and slept at Godhaie; got flour, milk, and fowl . . . Had written so far after turning in at Godhaie in a lumber room of the lambardar's house. At 9 P. M., just as we were falling asleep, a messenger came in from my shikari Nibra to say that the two sahebs who were pursuing us had just arrived at Dars, and that one was pushing on *at once* for my nullah! No time for delay, so up we got, ordered four ponies to be got ready immediately, dressed, prepared some food for next day, put on our great coats and mufflers, took a blanket each, and started! Only two ponies had come, and I was the first to descend from the village to the path below. What should I see in the moonlight but an ulster-clad figure, striding along the path just before me! "Stealing a march," thought I, as I sang, out, "Good evening." The ulster turned round as if pierced by a bullet! But I draw a veil over the harrowing effort at conversation that ensued. Each of us dissembled our joy at meeting so unexpectedly; and the ulster soon fell behind, *to make tea* (a euphemism for getting a pony and pursuing *me*), and T. and I rode on, feeling that we had our work cut out for us, as the ulster was, we both agreed, "a d—d nippy chap," and we should have to go ahead if we meant to win.

Many times we had to dismount, and drive our ponies before us across the steepy path, where a single false step might be fatal. Once a lot of stones came clattering down on us from above as we were scrambling across a steep slope of *debris* and a stone about six inches in diameter grazed my shoulder and nearly sent me down the slope. We were pretty "nippy" (I thank thee, T., for teaching me that word) in getting across that slope, steep though it was! A night-ride *viá* Mykiel to Astor is very picturesque, but otherwise undesirable. T. and I reached Astor at 6-30 A. M. Our men got in at 8 o'clock, having also ridden all night; and said the ulster had got a pony and was riding on too.

March 27th.—We had breakfast in Astor fort; a jemadar there was most kind in bringing us firewood, eggs and milk; and while we were waiting for fresh ponies, which (the tahsildar said) had to be brought from a village three miles away, we saw, to our dismay and anguish, that nippy ulster riding gaily past on a fresh pony that he had obtained just outside the fort! The agony of those three hours we waited for the ponies! However, I did one thing that somewhat assuaged my torments. I got the tahsildar to send a smart boy on to Harchoi and Duskin, and have fresh ponies ready for us at both those stages on the way. Right well did that youngster nip! At 11 o'clock one pony turned up, and the other was "átâ," so, as it was my nullah that was in most deadly peril, T. very generously let me take the first pony, and, throwing my blanket over the rough saddle, off I galloped down a steep mountain goat-path; but the pony was a sturdy one, and took me along well. Ten miles passed quickly but still the ulster was not in sight; he had nearly three hours' start, and a good pony, and made use of his chance. A little beyond Harchoi the fresh pony met me—a little rat of a thing, about eleven hands high, but with the heart of a thorough-bred, the most spirited little pony mare I ever rode! After an hour's hard riding I was evidently gaining on the ulster; his *pugs* (I have a good eye for pugs) were beautifully fresh, and at length, on rounding a corner, there was the beloved object just rounding the next corner, not quite a mile ahead! His pony was clearly dead beat, but he was nipping on gamely, and got to Duskin first. When I got to Duskin I found the reserved pony was not up to racing form, and there was no other, so I booked the Duskin pony for T. The ulster was down in the valley a mile below, wacking the lambardar, who (I heard afterwards) refused to produce a fresh pony. The little pony's owner agreed to let me take her on to Turbyling, a vision of five rupees if I won, illuminating the dim but glorious vista of his future. Off I galloped along a flat stretch of road for four miles, the pony-wallah cutting along after me. From the hill-top I cast a last longing, lingering look behind: no sign of the ulster, so I had now recovered my original start. But there were fifteen miles to be done, the last ten on foot, alone, and in the dark, and I did not feel at all sure of the result. No use trusting to the adversary giving in; he was much too experienced a traveller to let himself be outraced by a mere griffin; there might be more of his night marching tactics, and I resolved not to stop till I was fairly in my nullah that night. Just beyond Dogni I let the plucky little pony go back. Her owner fell at my feet when I gave him the five rupees! It was sunset, and I had to traverse the precipitous Rámghát alone and in the dark, until 8 o'clock, when the moon rose. On I plodded, with my blanket over my shoulder, hardly able to walk, parched with thirst, up and down, across shingly slopes, along sheer precipices, a weary way indeed. At times I felt quite done, and lay down on the path to rest my back, and thought of chucking away the blanket, but the rattle of falling stones from the cliffs seemed to me to be approaching footsteps, and I was up and off again.

Like one that on a lonely road
Doth walk in fear and dread,
And having once turned round walks on,
And turns no more his head;
Because he knows an ulstered saheb
Doth close behind him tread?

So on I toiled till at last the last ascent was over, and I stood in the "cauld blast" on the summit of the pass, and could see the Rámghát rope bridges, two dark lines far below, crossing the white foaming

Astor river, there rushing to its junction with the Indus. There was not a sound from the lonely path by which I had climbed. I had only a mile or two further to go, so I rested for a bit on a rock, and then began to descend the track. Suddenly I heard a deep growl, and saw a black object move on the rocks about 15 yards below me! "A bear," thought I; and picked up a big stone, with which I let drive. A thump, a yowl from a dog! and up jumped some men from the rocks beside which they had been sleeping.

The situation was soon explained. They were travelling from Gilgit to Astor, and were resting there on the ridge. "Give me some water, I am dying of thirst"; and I soon had a little gourd to my lips, and drained it. Then they offered me bread, but hungry though I was, I could only tackle a few mouthfuls. I gave the man who gave me the water a rupee, and asked him to guide me down to the fort, which he did; and he also let me keep the little gourd as a memento of a most blessed drink. It was 10 o'clock when the Rámghát sentries finally made up their minds not to shoot, but to let me pass the fort and bridge; and in another half hour I was asleep on the sand beside a rock, with my blanket over me, careless of ulsters and night marches indeed, for I was in *my* nullah at last!

March 30*th.*—Twenty-three oorin (*Ovis vignei*) came down close to the hut last evening. Unluckily my binoculars are with the heavy kit, now at Astor, and I have only four cartridges with me.

At midday I set off along the Boonji road to look for oorin. A large herd—about 40—came down hill, crossed the plain, and went down to the Indus to drink. While I was stalking them a shot in the distance set them off, and I fired two shots at the leading ram, about 400 yards, as they stampeded. The shots fell very close—not more than a foot away. The herd went quietly up hill and began feeding on the slopes. Mamdu and I sat down behind a rock and watched them for about an hour; they fed over a ridge, and into a ravine.

We hurried up the slope they had quitted—about 500 yards' climb—and, peeping over the edge, saw them on the opposite side of the ravine, about 250 to 300 yards off, and somewhat below us. Aiming at the biggest ram, I fired, and hit him in the flank; and with the left barrel hit him again in the neck; still, he went on, and I had no more cartridges. After going up some rocks he lay down but bolted again a short distance when Mamdu got near him. I signalled where he had gone, and Mamdu got down to him, and caught hold of him; but up he jumped, and Mamdu let go! He went about 50 yards down, and fell over, dead; Mamdu got down to him, and *halaled* him (low down, to save head skin). The horns measured 24½ inches. The festive tiffin cooly hoisted the body on his back, Mamdu taking the head. Joyful prospect of mutton-chops. Had a beastly scramble down the steep path in the dark, but got in safely.

March 31st.—Busy skinning, &c. The head skin very skilfully taken off by Mamdu. Irides pale yellow. Several very pretty little birds about; a little black and white bushchat and a white-winged redstart (*Pratincola caprata* and *Ruticilla erythrogastra*) keep at work just in front of the door. It is quite a week since I have seen my cook; left him at Boorzil to follow with the kit when we pushed on. In the meantime my culinary implements and materials are: A Warren's broiler, a small kettle, a concave iron pan for baking chupatties, a leather botel (*chagul*) for water, two plates and two tumblers of enamelled iron, two forks, one knife, three spoons, pepper and salt case, pot of Liebig, tin of Epp's Cocoa, and the following supplies from Boonji: A block of sugar, some crystals of rock salt, 14 lbs. of coarse gritty flour, a bag of dried apricots (called *kobaini*), several dozen eggs, and some fowls. The eggs in various stages of decomposition. Besides there is the *oorin*, which is really very good mutton. Now what more does the hunter want in the way of wittles! As to the process of making chupatties, it is too awful. Mark Twain's "I pass" comes to mind as one watches the wily native patting a lump of dough to and fro in his filthy hands, but the final product is not bad, though, like old port, I fancy there is a good deal of "body" in it.

April 9th.—A foraging day. The cook announcing that the larder is empty, I resolve to go for the oorin seen the previous day. Of course, not an oorin was seen all day, and so the poor dog got none. I rested on a ridge overlooking Boonji plain, and while grazing about me, a tiny little leveret, about three days' old, came hopping up to me as I sat still, and squatted down a yard from me. I easily caught the little thing, but it squealed so that I let it go soon, and off it scampered among some stones. There are many ram chikore (*Tetraogallus himalayanus*) on the hill, and they are pairing—an affair that evidently requires very great eloquence on the part of the male bird. Lower down there are chukor (*Caccabis chukor*) scattered about, some already in pairs. No Markhor seen to-day.

April 14th.—Got the Markhor to-day that I had seen the first day

I went out; disappointed to find that his horns were only 25 inches after all. We went up the nullah as on the 11th, and I spotted them, three males, two females, about half a mile above us. They went up a ravine, and we followed, but a drifting cloud covered the nullah, and we took the left bank while they had gone up the right. We worked up till, at 5-30 P M., Nibra saw one on the other ridge far below us. He and I crossed three ravines, and quickly got to the place, but the breeze (as usually at sunset) had shifted, and they winded us and were 200 yards off in the next ravine where I thought I was just 20 yards from them. The sun was right in my eyes, but I hit the old fellow as we went up the opposite ridge. I had put up the 200 yards' sight, and N. said I had hit him in the hind leg, so I thought I must be low (found afterwards I had smashed his hip), and put up the 250 for the left barrel. This went just over his back; he was limping slowly along the edge of a steep sheer rock, and, lowering the elevation to 200, I fired again, and plugged him fair in the middle ribs, and over he went, heels over head, right down the precipice, about 800 feet from rock to rock. The core of his left horn was broken, and his skull and jawbones were in fragments. With the left barrel I knocked over one of the smaller ones, but he only fell a few yards, picked himself up, and went out across a glacier on to a bed of deep snow in which we lost sight of him. (I got him when the snow melted, and found that the horns were barely 18 inches, so I threw them away.) These were my first Markhor, but now I shall be able to judge better of the right size to shoot at, and will spare the small fry.

April 15th.—Right up the hill tops, along the very crags where those six old ones had gone the other day, but we only saw the surviving young male of yesterday and some female Markhor.

The number of Lammergeyers (*Gypaëtus barbatus*) one sees is quite surprising. I saw one nest, but could not get at it. Two ram chikore alighted on a rock within ten yards of me, and never saw me. The male bird went on bowing and waltzing and crooning to the female, just like an old cock pigeon; then he would throw his head back and scream! So he went on for quite five minutes, until a Lammergeyer sailed overhead, when the pair flew screaming away.

April 17th.—Path up nullah, partly along river bed, partly on the face of a cliff, very bad going. The way the coolies, with loads of 80 lbs., get up these places is quite marvellous. I find even a rifle too cumbersome for some of the bits these men scramble up, loads and all. It is very warm here at midday, the rocks being quite bare and the valley narrow and steep; but after sunset an icy wind comes sweeping down from the snows above, and there is a continual rattle of stones. They fly in regular volleys, leaping 100 feet at a time, kicking up a cloud of dust and crashing like a battle. Many animals are killed thus, and occasionally men too. Hence the choice of a camping-ground is a matter requiring deliberation, and it is always safer to avoid the river-side and get up on a ridge, even though water may have to be brought up. I saw to-day, at 9,000 feet, the first pair of blackbirds—there was no mistaking the dear old "ouzel cock with tawny bill," and they seemed to be preparing to nest hereabouts.

I did not think of shooting them; but I find from Jerdon, Vol. I., p. 527, that if I had done so it would have settled a doubtful point of ornithology. One has to put aside zoological researches that require shooting, if one wants any game to remain in the nullah. Another old friend I met on the way up, was a wild raspberry bush just coming into leaf. I also caught a black lizard, red speckled beneath, and he is now "spirited away" with sundry snakes for a friend.

April 18*th*.—Cloudy morning; started up hill to explore new ground; rain came on, but we persevered. Saw a pretty white-headed red-start (*R. hodgsoni*), and watched the little dippers (*Hydrobata sordida*). (I at other times saw *H. asiatica* and *H. cashmiriensis* plunging into the turbid swift flowing torrent, and timed their dives, the longest being 43 seconds). The red-start kept on spreading out his tail (like a fantail flycatcher), and making darts at flies on the face of a rock. While climbing some rocks at 10,000 feet an old hen ram chikore flew up clucking from a ledge of rock about ten yards above me. "Eggs," thought I, and scrambled up to the place, and there was the nest, about a foot in diameter, in a sheltered little crevice, a few twigs as a foundation for a thick layer of her own grey feathers; and six eggs, very like capercailzie eggs, but larger. Nibra told me that they lay 18 or 20 eggs, but as these eggs were hard set and very troublesome to blow, that old bird had laid all her eggs clearly, and unless hens club together occasionally (as I think weaver birds and munias must sometimes do, and some of the *phasianidæ*), I fear Monsieur Nibra was telling one of his not infrequent "corkers." Well, allowing 12 days' incubation, and six days for laying the six eggs, this snow-hen must have had her nest ready on April 1st, of which sportsmen take note. Saw no Markhor to-day.

April 22nd.—Had not climbed far up the cliff when Mamdu spied a Markhor on the sky-line half a mile above us. The wind was down hill, so we watched him, a fine old fellow, with wide sweeping horns, and saw that he was accompanied by one young male,—evidently our missing two of yesterday morning. Up we scrambled, and luckily found on a flat rock a shallow pool of rain-water, three-fourths of a pint perhaps, which we shared. Much refreshed, we were climbing on, keeping to the left out of sight of the Markhor, when Mamdu said "a man is coming down towards us." And so there was, Rehman with another cooly bringing food, &c. I at once said to Nibra, "Get over to that rock; the markhor will come down from those men"; and the moment we got to the ridge, N. excitedly exclaimed "Banduk jaldi kholo—markhor bilkul nazdik hai!" ("Uncase the gun quickly—the markhor is quite close.") We ducked down; I had the rifle out in no time and shoved in cartridges; but the old fellow had caught sight of my hat and turned back, and was bolting down the rocks as hard as he could leg it, about fifty yards off. Aiming steadily I let drive, but thought the thud sounded as if the bullet had smashed on a rock, so I ran across to give him the left barrel, when he should re-appear in the nullah far below. There was a great clattering of stones, and down he came, but not galloping! Rolling and rolling, on and on dead as a nail, for about 300 yards he rolled and then lay in the nullah, with the stones still dancing past him that had been loosened by his fall. "Got him, Nibra." "Salaam, salaam, Saheb!" from the delighted shikari. Rehman and the other cooly come down as we are "bucking" about this bit of good fortune, and we send them down to take the trophies, while we pitch into the chaguls, and tea and grub. Then we light a fire behind a rock. . . . Here he comes, out with tape:—

Horns, round curve, 43½ inches.
,, circumference, 11¼ ,,

A fine old billy-goat and no mistake. Despite his tremendous fall and roll, the horns are uninjured, but the skull is cracked and the lower jaw smashed to bits.

April 24th.—Shortly after starting at six, I saw three old male Markhor. While stalking them I found that the sportsman in the adjoining nullah of Shaltar was simultaneously stalking the same animals.

We met, and resolved ourselves into a friendly boundary commission, with the result of proving that my visitor was at present camped and pursuing game within the limits of my nullah : but as he had not up to date been successful in getting a Markhor, I asked him to finish the stalk and went to camp.

In the evening I went down my ridge, and fired at and missed a good Markhor. He was lying down, and I could only partly see his head, about 100 yards below me. If I had only had the patience to wait, he would have stood up and died, but his *kismet* was good, and Zeus, the son of Kronos, took away sense from me, and I fired at, and missed the little patch of neck that was visible.

We used to call this Markhor the "Dost" ("friend") afterwards, as he always turned up at that place when wanted, and a little male (he who had been with the big one I shot) attaching himself as scout to the old fellow, my men called him the "police-wallah," he was so vigilant. I never got that old "Dost," but he disappeared, and I fear got into trouble through going round into Shaltar once too often.

April 28th.—I made a really good stalk to-day, and shot a fine Markhor, 38½ inch horns, girth 10½, divergence between tips 33. The morning was fine, but the aneroid had fallen to 20·15. and clouds gathered at 8 A. M. I had intended going towards Rámghát, along the ridge of the hill, and sent Nibra off at 7, to scout for that old fellow I missed so idiotically the other day. He came back soon to say there was a herd of Markhor in the west ravine, about 800 yards lower than the camp. By this time the sky was quite overclouded, and the wind all over the place, so, though they were splendidly placed for a stalk, I refused to attempt it, and waited till 1-30 at the camp, hoping against hope for a steady wind up hill. At 1-30 the sun came out overhead, the sky cleared at once, and with the increased surface heat the breeze began to come up fairly steadily, though still veering a little now and then. However, I decided to chance it, and down I went with the two shikaries, leaving Rehman on the cliffs above to watch; with great care, frequently tossing pinches of dust into the air to test the wind, we clambered down the spur. There were three female Markhor high up in the ravine ; then a single one lower, as a link ; and then three males still lower down, lying together asleep in the middle of the dry stony bed, here about 200 yards broad (I should mention that the branch of side ravines are usually dry, as more stone than water flows down them). When about 500 yards from the markhor, we got full in their view, but by crawling very slowly, in our grey *puttoo* clothes, over the faces of the steep rocks, we managed to get to 350 yards without attracting notice. Then it was plain sailing down a gully to about 200 yards, whence, leaving Mamdu with the alpenstocks, we carefully descended about thirty yards further. Crawling out on a rock we peeped over. Not a single markhor was to be seen! Every one of the three males had vanished. How we blessed the wind! We must have been winded; but where had they gone to? We scanned the nullah up and down, but in vain. At last some slight movement on the rocks opposite, about 250 yards away, caught my eye. Yes, there was a female markhor lying down quite at her ease—she suspected nothing. And then we gradually made out our three friends—one big and two moderate sized; they had climbed about 50 yards up the precipice facing us, had comfortably ensconced themselves in holes under stones, and were just settling down for a siesta. The biggest fellow was not comfortable enough, so he got up, butted a smaller male out of his bed, and lay down in it. The small one, much disgusted, went on a little further. We meanwhile were in full view, but got across about fifteen yards of a ledge, while the fighting was going on, and so behind a yew tree. Here we waited. Then the big one jumped up, and followed by one small one came quickly down the rocks to have another feed of the green grass below. We crawled a few yards more, and found that we could not get an inch nearer without being seen. The three females were right below, 150 yards off. The big one walked across and joined them. My chance had come. Lying flat out on the overhanging rock, I put my hand back for the rifle, which N. drew from its cover, and passed up to me. Quietly loading it I took careful aim at the markhor's shoulder as he stood broadside to me, and slowly pressed the trigger. At the shot he swung round and made a bolt. I fired again hastily and missed by a few inches. After going about 30 yards he stood with his back to me and I fired a third time. I felt sure I had hit him, but he hopped up the rocks opposite, and then Nibra said "his shoulder is broken; he is going on three legs." He climbed about 20 yards, slowly pausing several times, and then fell head over heels down again into the nullah. Taking my penknife (the shikar knife was behind with Mamdu) N. scrambled down and *halaled* him. When I got across, Nibra pointed to his left shoulder, all smashed with the express bullet. That was shot No. 1. Turning him over, I showed the sceptical shikari the other bullet hole, right through the lower part of his back. A good stalk well ended, and pointing the moral that if the wind is unfavourable one should wait till the clouds roll by. The camera did not get down till 7 o'clock, when I photographed the old fellow, using full aperture and giving 45″ exposure, but the negative even with that proved to have been under-exposed. By the way, let me warn photographers in these altitudes that double or treble Indian exposures may, and, indeed, often must, be given with ordinary plates.

May 2nd.—Right down to the bottom of the valley there is snow; here at the tent-door it is a foot deep, and the weight on the canvas (I am in a tiny single fly-tent, six feet by four, and four high—weight 25 lbs.) was so great that I had several times to thump the roof to make the snow slide down. The ridge beside which I am camped is composed of masses of shattered and sharp-pointed rocks; when masked under a layer of snow, climbing across them is far from pleasant, or indeed safe. As the weather seemed more promising, we set out along this "path," however, and with difficulty getting down to a broad shelf to the S.- W., saw below us eight male markhor, with but one moderately big one, say 30″. We also saw the "Dost,'' but he was on his usual inaccessible beat, and after spending four hours in trying to get up to him, we had to leave him in peace. Then we worked down a spur, ending in a sheer precipice not far above the river. From above, one could not see the face of the cliff; it was too steep and rugged; but beyond it, on a large boulder below, a female markhor was standing sentinel, and I concluded that the herd of eight males must be near. Climbing down to the left we got on a ledge of rocks that gave us a view of the face of the cliff: and there five of the animals were lying on small ledges here and there in the very middle of the precipice—a place that no four-footed creature but a wild goat could have possibly approached. The wind had been rather unsteady all day, and soon a female gave her note of alarm. The five males on the cliff began moving down, and I was aiming at the biggest fellow, that was highest up, when Nibra said, " not at that: fire at the second one.'' As he had been looking through the binocular, I thought I had probably mistaken the big one, and so I fired (180 yards) at the second markhor as I was bid. Over he went, right down the cliff, a fearful depth to fall, quite 400 feet sheer drop. Mamdu by going round a mile got down to him, and my disappointment can be imagined when I found that the 30-inch one had been let off, and that I was the possessor of a 22½-inch head, through taking my precious shikari's advice. The body and bones were all shattered, but the horns, massive looking, were not damaged.

May 9th.—Went up ridge towards the east; not much snow to climb through. The three big ones that had been fired at by my neighbour were spied far up in the precipices above us . . . . We are now on a level with the three, about 250 yards off, but I mean to make it 50 yards before I fire, having about 100 yards of deep snow to cross, and 100 yards of a glacier to get down, and then some rocks to climb! . . . They do look three rippers, and one must be forty-five at least! Had a hard climb over the snow slope, which was steep and slippery, and soft in places, though only once up to my elbows, but at last the yew-tree near them, the destined firing point, is reached, and I peer through the thick foliage. The big fellow is there some 60 yards off, lying down on a pinnacle of rock and gazing (with that sad far-away look one often notices in these animals when watching them through a telescope) down into the valley: the other two are not visible, being lower down, between him and me. I was not very steady I fear, but it looked too easy for any doubt of success, and taking aim through the yew boughs, I fired. The old fellow fell backwards and out of sight. "Mara" I cried to Nibra, and jumped up for the left barrel, just in time to whang it fair into the bigger of the other two markhors as they dashed past about 30 yards off, and over rolled number two. Having duly *halaled* him, we went up for number one. He had vanished, and there was that fatal and perfidious bullet's mark an inch too high! Horried sell—a miss through sheer cocksureness: number two is a handsome markhor however. Horns 34 inches long, 12 inches girth, 30 spread; a clean graceful head.

Photographing the slain took a few minutes, and then leaving Nibra to look after the trophies, I took Mamdu and Rehman with me, and went down hill intending to take up the tracks of the big one and perhaps come on him. After descending about half a mile, we had a careful survey of the valley with our telescope and two pairs of binoculars. I made out a markhor, a small male, lying on a rock about quarter of a mile off, and somewhat below us, and then we made out others. They were on a sort of rocky plateau, with a few yew-trees stretching their arms from crannies, and a deep stony nullah lay between. We could not make out any big one, but it was mid-day, and big ones would then have been lying in the shade and probably invisible, so we worked down carefully to a ridge that gave us a good view and a good place to stalk from, and watched. At 5 o'clock the markhor had fed down to the steep bed of the ravine between us. and were crossing to our side. I had got a glimpse of what *seemed* a big markhor earlier in the afternoon, but he was among some yews. I could not see his head, and we did not again catch sight of him, but on the strength of the doubt I resolved (luckily) not to fire at anything even medium-sized. Carefully working down the crags, now and then in full view of the unsuspected herd below, who were too intent on the young grass to be very watchful, I got to within 200 yards, and found that the herd had increased to thirty, by additions from our side of the ravine, but that out of ten males there was only one head worth a bullet, and it was only 27 or so. Accordingly I decided not to fire, but to follow the herd closely as they fed across ridge after ridge, and just watch the animals without alarming them, though they were scarcely fifty yards off. It was now 7 o'clock, but the wind was still steady ; and the sun was sinking behind the hills of Gor, and I was beginning to reflect that I was likely to be belated and have a lodging on the cold ground instead of dinner, the *Asian*, and bed. Suddenly Mamdu whispered : " There is a big fellow on the edge of the slope" ; and there, indeed, was my very friend of this morning, a grand old shaggy white-haired long beard, with horns sweeping straight up from his stately head ! He was standing in the shade of a yew about 300 yards off, below and opposite. He seemed to ignore the great herd passing him, and came slowly down, the slope as the band of youngsters worked up it. The darkness was falling fast, and I feared that the herd would not be all across the ridge before it became impossible to shoot. I looked at my watch—it was five minutes to eight, as the last small one passed over and out of sight. The big fellow had moved down below some rocks, but I had a good notion of his whereabouts, so I hastened very circumspectly down the steep grassy hollow, avoiding the numerous loose stones as well as I could. Now a bent stick thirty yards off seemed in the gloom to be his horns, and I paused ; but a look with the binoculars showed that it was not the veteran, so down I crept with rifle at the ready, to the edge of the rock, beneath which

I expected him to be. He was there not twenty yards below me, and our eyes seemed to meet at the same moment! Off he bolted; and with as much steadiness as I could I aimed at the vanishing white object, and fired. He did not even swerve, and I quickly fired again but he galloped on round a boulder and out of sight. Mamdu (who was close behind) said he thought the first shot had hit him, and I had that sort of instinctive feeling the rifleman knows of having been on both shots; but in the gloaming one could not be sure, and it was with no little trepidation that I descended to enquire. We soon caught sight of him, standing about 100 yards off at the base of a cliff, partly hidden by a yew-tree; and sitting down I fired, when he made a rush, and vanished beyond the tree. Coming up, after few moments of suspense, Mandu said: "Got him." And there he lay, quite dead with bullet No. 1 in the middle of his back, No. 2 chipping a little bit off his right horn, and No. 3 through his shoulder and heart. He is a burra wallah to look at, and does not belie his looks, his horns being 46 inches round the curve, 13 inches in girth, and 30½ inches between the tips. A prize, indeed! We soon had a fire blazing and made ourselves ready for the night. We had no blanket, but it was not cold; there was a little water in the chagul, which, with some scraps of tiffin remaining in the basket, and the invariable pipe, sufficed for dinner. I could not sleep, however,—hating this sort of lodging on the cold ground—and spent the night, as usual on such occasion, in smoking and adding fuel to the fire. The old billy-goat favoured us with a "bouquet de bouc" more powerful than pleasant whenever the zephyr came round from his vicinity; but "bukri bonus est odor quâlibet ex re," as Vespasian might have observed had he been present, and I would not object to such a perfume distilled from such a *stalk*, every day of the year. Yet I must say that I never felt less keen to take a wild animal's life than I did to slay that magnificent old markhor; he looked so dignified and venerable with his flowing grey beard and noble mien, that I could not help thinking him like one of those reverend patriarchs that Blake had drawn so well in his *Book of Job*, or Flaxman in his *Dante*; but the primæval savage in me prevailed, and the noble old chap succumbed to Holland and Holland, after escaping in the morning.

May 10*th*.—Having had no dinner and no sleep, the climb up was tiresome; but things have an end, and I got in, dined and breakfasted, and went to bed. In the afternoon I put arsenical soap on the headskins, and packed them and the heads for their journey to Mahdoo, the eminent taxidermist (or *mochi*) at Srinagar.

May 13th.— The evil destiny of the female sex, with the best intentions in the world, to get their male relations into trouble, could hardly be better illustrated than in the case of markhor. It is the females who are always on the watch, while the males are snugly asleep under some rock ; we see Sister Anne on her watch-tower, and so discover the abode of old Blackbeard. To-day I have been up to the highest crag over the Rámghát valley, climbing from 6 to 12 o'clock, and have only just found game. About a mile below me, on the edge of the cliffs about the river, when we had given it up as hopeless, and were planning to go after ibex to-morrow, out walks a cautious female, looks round, skips up on a smooth round rock, and settles herself to survey mankind from Astor to Rámghát. Couched on the rock, she is watching the hillside closely, but we have been watching longer than she, and her eyes won't light on us just yet. Perhaps in the coming by-and-bye we may meet for a brief ecstatic moment. Nothing to do now, but lie in a crevice of the rocks from 12 till 4 or 5 o' clock, when the family will come out to graze . . . Family don't come out, so we call on them, and find only one small (18″) gentleman and three ladies at home. Sleep under an overhanging rock comfortably enough.

May 21st.— A long day's work. Started at daybreak across the valley, descending to river, and finding a practicable path up the opposite cliffs after several failures. Then struck along ledge of cliffs about half a mile below the ibex, 31 in all, intending to have a go at the markhor first. After climbing for 3½ hours to the shoulder where the markhor had shown themselves yesterday afternoon, we sighted them about a mile below us in a steep ravine. It was too far to go down again, so we went on for the ibex. The two biggest bucks and two females were in a small ravine near us, say 600 yards off, and the rest of the herd were scattered about, some lying down, some feeding, some skipping about and playfully butting at one another. It was my first sight of ibex near at hand, and I was surprised at their appearance, my idea of an ibex having been based on the picture of a European ibex that (taken from the Old Shekarry's *Sport in many Lands* and Cassell's *Natural History*) does duty for *Sibirica* in Sterndale's *Mammalia.* Instead of an agile, slender, gracefully-stepping creature, I found the buck ibex to be a heavy yellowish brute with short brown legs, a very massive barrel-shaped body, almost pig-like in his gallop, and with shaggy flanks and neck and beard. Neither in mien nor gait is he such a fine-looking animal as the markhor; at the same time his activity is equal to the markhor's. The two big fellows got angry about something or nothing, and had a very serious butting match for full five minutes. After it, to our great disappointment, for they had been splendidly placed for a stalk, they set off, about 11 o'clock, to join the rest of the herd, and went along the hillside for quite a mile and a half, some of the females going too, and others remaining scattered about, thus blockading us completely. As the day wore on, they mostly lay down to sleep, lying quite flat on the sides with head thrown back, and all four legs stiffly stretched out, not doubled under them, basking in the sunshine. So we had to sit behind a rock and watch the big ones loafing on and on, further away from us, while we dared not budge lest the scattered females and small males should discover us. Over a distant slope the big ones went, and gradually the others followed, all passing out of sight, except five females that seemed disposed to sleep all day. But at 5 o'clock they too rose and quickly trotted after the herd and over the slopes, and the coast was clear at last, so far as we could judge. The ground, however, was a network of stony ridges and ravines, with yew-trees and thickets here and there, and we could not tell whether all had gone or not. However, as we had two miles to go, over rugged ground, we started. When half way, two shrill *whistles* above us from four females that had been lying higher up, and had winded us, showed that we were caught; but though they repeated their signal five or six times, they made uphill instead of following the herd, and we went on. At the crest of the ridge we had to wait once more, as the big ones were far below, feeding, and three females were lying close to us. The wind came steadily up, though it was now 7 o'clock, and soon the three sentinels rose and went down to the herd below. We followed, keeping below skyline on the outer side of the ridge, and soon got to within fifty yards of where the big ones had last been seen, but there was no sign of them anywhere. Some females saw me peeping over, stared suspiciously for about four minutes, while I kept quite still, trying to catch sight of the big ones, who were somewhere close by. Then the wind veered, a general stampede took place, and out bolted in the crowd the two big fellows from right below me! As I stood up to get a clearer view, the boughs of the yew caught the sling of the rifle, and so checked me for a second or two, and the big ones had got to the other side of the ravine, about 130 yards off, when I fired, only the bigger of the two being in sight. I had the old 12-bore rifle in my hand, the Express being behind as a second rifle in case I got more shots, as often can be done with ibex, and aiming steadily I fired. The ibex bolted at once, and I could not fire the left barrel, he having got into a hollow that hid him; when he re-appeared about 200 yards off, I fired two shots with the Express, but went high, Nibra said. The herd made uphill, but the big one took a downward course Once he slipped and staggered, and I exclaimed "he is falling," but he recovered himself and went on, and Nibra said I had missed him clean. He disappeared over the edge of a cliff, and did not re-appear. I watched the others for a bit and then asked where the big one was. They said he had not yet come out of the ravine, and then exclaimed, "there he goes, not hit." He climbed slowly along the face of the cliff, and then pulled up on a sloping rock, in full view of us, about 500 yards off. We were watching him with our glasses, and all at once ejaculated "khun!" (blood); a great gush of blood was streaming down the rock from him. He lay down for about five minutes, then painfully rose, walked three or four yards, and lay down again, the blood crimsoning the cliff beneath him. He was hit, and hit vitally and hard. Old Joe Lang had gone straight as usual. We followed, but the ground was so bad that we had not got to the cliff when darkness came on. It was impossible to get further over such dangerous ground in the dark, so we made ourselves uncomfortable for the night, under a yew-tree, and lit a fire. At 2 A. M. a heavy thunderstorm came on, wetting every stitch of our clothes in five minutes, and we passed the rest of the night very miserably indeed, drying our steaming blankets and kit.

May 22nd—At daybreak, just as we were getting ready to start, we heard a terrific crash from a precipice far overhead, and some fifty tons of enormous stones came thundering down, several passing right over us, so swiftly that only the whizz was heard, but the stones not seen; and soon after, a single stone plunged right in our midst, ploughing a hole in the ground a foot deep and spinning on to the river half a mile below! Having made tea, we proceeded to search the precipices for the lost ibex—a wearisome perilous quest, and unsuccessful, the rain having washed off every stain that had yesterday incarnadined the rocks, and obliterated every footprint in the gravel and sand. Our only hope now is in the crows and vultures. By watching them we may yet be guided to the place.

May 30th.—Up ridge to point over Shaltar. Saw a tent there. I had expected to find Shaltar unoccupied, and have a few days round it; so went down my boundary. No sign of the markhor seen yesterday; worked towards home, but low down, carefully exploring ground; saw nothing all day, but in the evening came on them just a quarter of a mile below my tent! There were 53 markhor there (the three herds packed), only eight males and only two of those worth shooting! Leaving the fussy shikari, I made a fair stalk alone, but had to cross a ledge of rock about 200 yards from them, and full in view, when a female gave the alarm. I ran forward as they made up the cliff; they came across my front, working up the steep sheer cliff. When they were opposite, about 180 yards off, I fired and hit the biggest one; he stood on the rock motionless, and as I did not feel sure of his being sufficiently hit, I fired the left barrrel, and down he tumbled. The two bullet holes formed a figure of eight in the skin of his shoulder. I had rested the rifle on my hat when firing, so there can be little doubt that those two barrels shoot together, and are a credit to Holland and Holland. His horns were only 24 inches, but massive.

May 31st.—Having now got ten markhor (measuring 46, 43½, 40, 38½, 34, 28, 25, 24, 22½, and 18 inches), and the weather being very hot, I mean to take it easy and loaf back to Kashmir. I shall perhaps pick up some ibex on the way in Derrell or Loyen Harda. If not, I do not much care, as I shall come this side again, and spend a winter over the passes, and try for some specially big heads up beyond Gilgit or in Chilas.

June 8th.—Started up nullah, for one last day at the ibex. Found nest and three eggs of the White-browed Bunting (*Emberiza cia*); nest on ground beside a tuft of grass. Shot male—somewhat greyer on head than are European specimens. I fancy a transitional form to the Eastern *E. Stracheyi*. *E. cia* is common in these parts. Called on Mrs. Chukor, but she had deserted her nest, so I took it, 12 eggs, quite fresh.

June 9th.—Up to glaciers early. Climbed from 10,800 up to 14,000 feet along front of the ibex cliff. Ibex not within reach yet. I must sleep on cliff and make a two-days' climb. Saw a lovely bird, of which I noted the description at the time, and find it is *Accentor immaculatus,* the Maronne-backed Accentor. Jerdon says it has hitherto been only sent from Nepal and Darjeeling. It was at 13,000 feet in Dutchkut, where I saw it only once. Also saw a lot of so-called Snow Pigeons (*C. leuconota*). They were breeding at 12,000 feet in clefts of the chasm down which the right branch glacier stream flows, but out of reach. The Alpine flowers now are in full bloom; a more enumeration of them would be too long (even if I could name one-tenth of them); from every nook and corner of the rock they peep, and on the mountain meadows the air is sweet with perfumes. It is delightful to meet so many old friends among the flowers. The forget-me-nots form mirages of blue, they grow so thick in places.

June 11th.—Started up ibex cliff at daybreak; got right on top and along ridge to 15,600 feet, a beastly climb, along the face of a precipice 1,000 feet sheer in parts; made me squirm to look down. On the very top there were two little grey guinea-pig-like animals, some species of *Lagomys*. Their home was in a crevice under some icicles. Sterndale gives a number of species, but I am bringing back one of this sort for the Bombay N. H. Society to identify.*

June 21st.—Goorkhot to Chougam. Shot a mountain fox (*V. montanus*), or vixen rather. She was stalking some chukor when I interposed. Came along Ruttu plain opposite Mir Mullick nullah, a very fine valley, with pine forests and snowy peaks. Splendid view of Nunga Parbut or Dayamur, *nive candidum* from head to foot. Got to a hamlet and had the tents pitched just as heavy rain came on. I have just been watching a curious veterinary operation. One of the baggage ponies being footsore, the Bota (=Tibetan, if Bootan, Bodpa=Tibet,—&c.), heated a large flat stone in the fire, making it very hot. He then placed some green leaves (gathered from a sort of *Coleus* apparently) on the stone, made the pony place his fore-hoofs on the herbs and poured water over them), thus causing a cloud of vapour for some minutes, the pony standing quiet and seeming to enjoy his vapour footbath.

June 23rd.—In bed with a badly sprained ankle, which puts an end to my shikar, I fear. Yesterday we had arranged to move the lighter camp up the nullah, and a man was to come to show us the place where a bear had been seen lately. At 4 P.M. a villager rushed up to say that a snow bear was at that moment killing the sheep on the hillside opposite Dirrell village. We were off at once, and on reaching the huts could see the bear on the grassy slope above some sheep and goats, while a herdsman was

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*Royle's Pika, or Royle's Mouse-Hare, *Lagomys roylei*.—EDITOR.

hastening towards the place to drive the bear away. We pushed on, having to make a detour to cross two bridges, when suddenly a general cry from the village of "he's killing the man" made us tear along as hard as we could go—I leading, and the two shikaries scuttling after with the rifles. When we got to the shepherd—a boy of sixteen—we found him unhurt, as the bear only charged past him, but so confused that he could not tell us which way the bear had gone. We reconnoitred the hillside for a long distance, but in vain, and while scrambling up the slopes in *chaplies* (for my supply of grass-shoes had run out) I slipped and twisted my ankle, and again gave it a second and worse twist when descending. The pain was most acute, and now ibex are out of the question.

After four days in bed I could walk a few steps, so *June 26th,* I hired the lambardar's pony to take me up the nullah on khubber of a bear. Foot very tender still, but I can bear the pain if I can also pain the bear! Started at 1 o'clock on the pony, taking the ·500 Express only. After going about two miles up, came to a little branch nullah where I pulled up, and sent the pony down to the river to wait for me. I waited till 6, but only a fox turned up about 3 o'clock, barking several times, and then coming down to within sixty yards to inspect me and show himself off—a handsome fellow, with very bushy white-tipped tail, pale rusty face, and creamy yellow fur—his winter coat. As there was no sign of the bear, I rode further up the valley to look for another bear that was supposed to be there. He too was not at home. Turning round at sunset I began to ride homeward. We had gone about a mile, when the village-boy, who was with the pony, pointed to the opposite side of the valley, and ejaculated "Harpat!" I was off the pony in an instant and made the boy sit down and stop gesticulating. There was the bear, about quarter of a mile off. Leaving the pony behind some willows, I told the boy to wait there, and with my glasses I soon made out a second, and then a third bear, and found that it was a family party of mother and two cubs, all coming down to the river to drink. There were trees scattered about, and the wind was the right way, so when the men came up with the rifle, I had no difficulty (bar the lameness) in getting to the river bank unperceived. The old bear suspected nothing, but fed here and there, his silvery gray coat glistening beautifully in the ruddy glow of sunset. Between us was the torrent, the bear about 25 yards away in a thicket. I lay down on the bank behind some shrubs, and waited.

There was a small open space opposite which they would cross to get to the water. On they rambled, the old one leading. She is coming, my own, my sweet : a branch of a pine partly shelters her, so have patience, eager heart ; here she is broadside on ; bang !

She fell over at once, and I jumped up and gave the left barrel to a youngster, but I could not see whether I hit or not. The old one was still struggling, so I gave her another shot as a quietus. Sending the men across, they had to go up higher to a snow bridge. I went down the bank about 20 yards with Rehman and climbed a lofty pine-tree that gave a view of the opposite thicket, as I thought the other small bear might be about. We climbed alternately, handing the rifle up from one to the other, until a high branch was reached on which I perched myself, and discerned the back of a youngster. Aiming carefully I fired, and turned him over, dead. Looking with the glasses, I could then see dry blood on his fur ; the former shot had taken effect too. In the hope of the other youngster returning, I waited until it was too dark to see the foresight, when I descended and rode back to camp, my ankle happily none the worse for this little *tamásha*. As I was still too lame to climb I decided to march slowly back from Dirrell. On the way I looked into Loyen Harda nullah for a couple of days. There were plenty of fresh bear pugs, but I saw no bears. However, I got two shots at musk deer, and secured both, two young males.

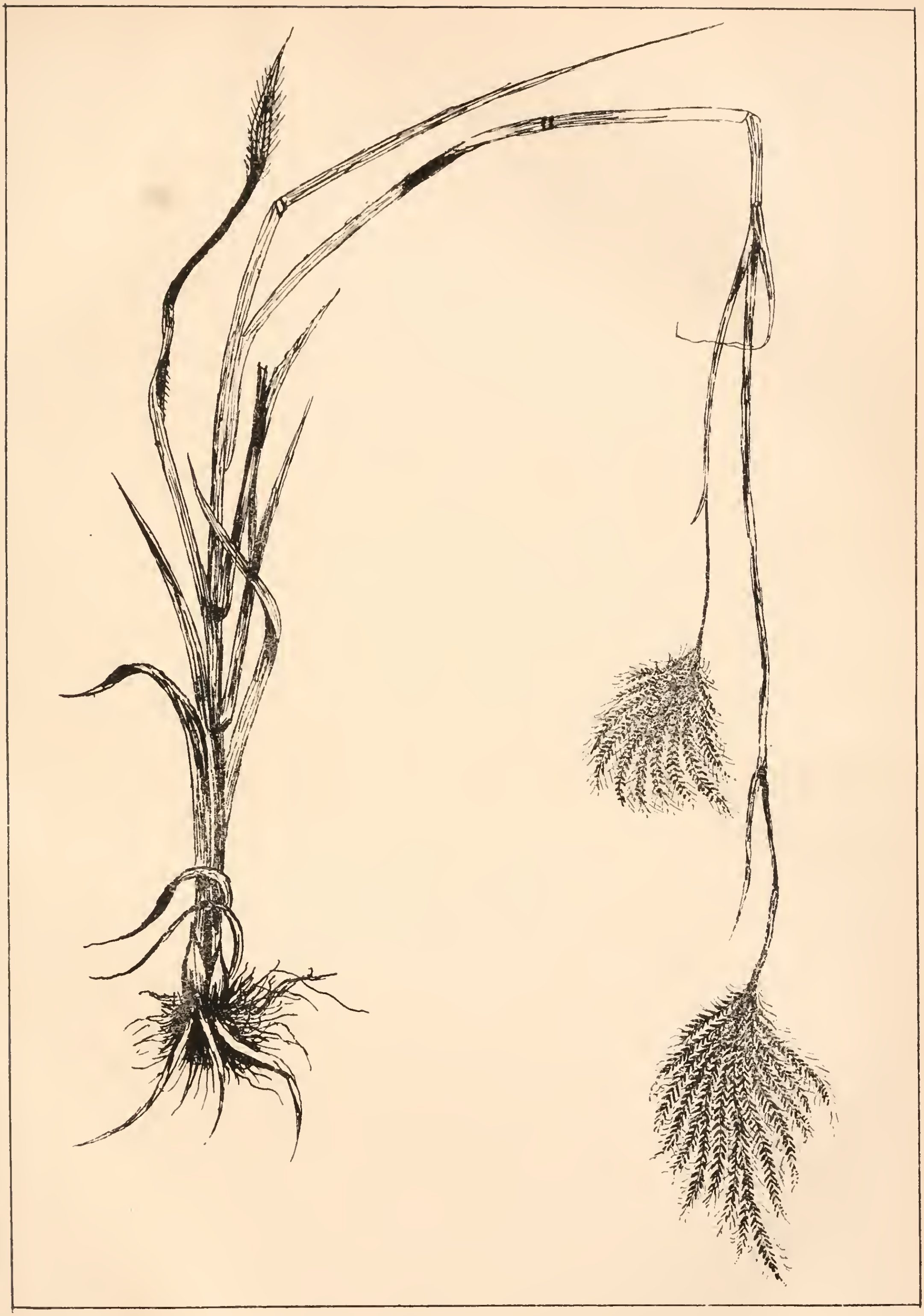
SHORT NOTES ON THE ODORIFEROUS GRASSES (*ANDROPOGONS*) OF INDIA AND CEYLON, WITH A DESCRIPTON OF A SUPPOSED NEW SPECIES.

By Mrs. J. C. Lisboa.

(*Read at the Society's Meeting on 7th August* 1889.)

There is great uncertainty about the number of odoriferous grasses growing in India, on account of the confusion in which the subject has been involved by various botanists and writers, who, overlooking varieties caused by cultivation or otherwise, have unconsciously multiplied species.

This can only be cleared up by a practical botanist who has travelled all over India and Ceylon, or had before him a collection of plants from these countries. There is no doubt that when he



ANDROPOGON ODORATUS. (*Sp. Nov.*)

Described by Mrs. J. C. LISBOA *in her* "NOTES ON THE ODORIFEROUS GRASSES OF INDIA AND CEYLON."

comes to describe the order *Gramineæ* in his Flora of British India, now in course of being written, Sir J. D. Hooker will, with the materials in hand, throw much light on the subject.

The present contribution is intended as the description of an *Andropogon* which I think is a new one ; and does not presume to clear up the obscure points about the scented grssses which may exist in India, for my knowledge of Botany in general is poor and limited to a few tracts of the Bombay Presidency.

Before I describe this *Andropogon* to you, let me briefly mention those that are already more or less known. We find the following growing wild or cultivated in different parts of India and in Ceylon, and yielding aromatic oils and other scented products.

1*st.* *Andropogon Nardus,* Linn.—This is a magnificent looking grass, with leaves glaucous, large and attenuated at the end ; the stem six feet high or even more, with a long drooping panicle about two feet or more in length consisting of numerous panicled branches. According to General Munro, the distinguishing features of this grass are its rufous colour, short spikes, and narrow leaves. This plant, which is said to grow wild in Ceylon, is also met with in certain parts of the Madras Presidency, particularly in the Southern portions near Travancore. It is also cultivated in Ceylon and Singapore, whence considerable quantities of the oil distilled from it finds its way to the European markets, where it is known under the name of Citronelle oil. (See a beautiful drawing by Trimen and Bentley in their work on Medicinal Plants, p. 297.)

2*nd.* *Andropogon Citratus,* DC.—This grass yields the Lemon grass oil, or oil of verbena of commerce. In India it is found in gardens, and appears to occur only in the cultivated state, although it is stated that in Ceylon it may be seen growing wild side by side with the first-mentioned species. The close resemblance it bears to the former would seem, however, to suggest the idea that it is only a cultivated variety of *A. Nardus.*

The specimen on the table, collected in the garden of the Bishop of Damaun, at Colaba, belongs to this plant, which is also shown in plate 280 given by Wallich in his *Plantæ Asiaticæ Rariores,* under the name of *Andropogon Schœnanthus.* *Andropogon Citratus* is known to the natives of India under the name of *Oli-cha* (green tea), and is in fact, used at times for aromatizing this beverage and flavouring curries. An infusion of the leaves is used as a diaphoretic in febrile cases, and also in flatulent affections. The oil is used internally for allaying vomiting and gastric irritability in case of cholera. It is also used externally in rheumatism.

The properties and uses of the last-mentioned species, *A. Nardus*, are similar to those of *Andropogon Citratus.*

3rd. Andropogon laniger, Desf.—(See Fodder Grasses of the Plains of North-Western India, by Duthie, plate 23.) This grass, known as woolly *Andropogon*, grows extensively in the northern coast of Africa, from Egypt to Algiers. It is also found in Arabia, and in the north of India. According to Mr. Duthie, it is common on cultivated land in Sind, the Punjab, Rajputana, and parts of the N.-W. Provinces, and it is also recorded from Thibet at an elevation of 11,000 feet. I had only one specimen (now lost) said to be from the Deccan. It is not ascertained whether this grass is distilled for the production of its oil, but its roots are sometimes used like *kaskas* in the manufacture of tatties.

4th. Andropogon versicolor, Nees.—This grass exists in the more elevated parts of the Central Provinces of Ceylon. Mr. Thwaites says :—"The inflorescence of this species has, when crushed between the fingers, a rather agreeable aromatic odour. The essential oil appears to be situated principally at the base of the spikelets."

5th. Andropogon Schœnanthus, Linn. ; *A. Martini*, Roxb. ; *A. Pachnodes,* Trin. (Sp. Graminearum. Vol. III., plate 327) ; *A. Nardoides*, Nees ; *A. Calamus Aromaticus,* Royle (Illst. of Him. Bot., plate 97), a variety with dense inflorescence.

This grass, named Ginger grass by Europeans, is known to natives as *Rosa*, *Rosha*, *Rose*, etc. etc. It is of all the *Andropogons* the best known.* It appears from the *Bombay Gazetteer,* Vol. 12, that in Khandeish people distinguish two varieties, one with bluish, and the other with white inflorescence. This is what the *Gazetteer* says :—"Another important branch of distilling is the preparing of oil from the forest grass known as *Rosha* (*Andropogon Schœnanthus*), which is of two kinds, one with bluish and the other with white flowers. The oil produced from the first is of a green colour, and is called *Sophia,* that from the other is white, and is called *Motia.* The *Motia oil* fetches a higher price than the *Sophia.* Both grasses grow

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*In their work above alluded to, Trimen and Bentley say :—"There is still great confusion amongst the species of *Andropogon* affording grass oil." As a proof we may point to the many names which the Rosha grass, as truly stated by them *the best known and widely distributed*, has received from botanists.

freely though not very widely in many open hill-sides in West Khandeish, especially in Akrani."

An intelligent Parsi, who some years ago farmed a field in Khandeish for distilling oil from this *Andropogon,* tells me that there is no such thing as blue or white varieties ; that the grass which bears bluish-green and white inflorescence when young becomes red when ripe. This accords with my observation regarding the changes of colour which this *Andropogon* undergoes as it grows in the Deccan and Konkan. When young, the hairs of its spikelets give it a peculiar greenish-blue or whitish appearance, but when it grows older the whole of the inflorescence with the bracts, or floral leaves, especially when these are exposed to or dried in the sun, becomes reddish, as anybody can verify this fact on their way to Poona at the end of the rainy season, and from the several specimens laid on the table collected in the Deccan, Thana, and Khandeish. Those of the last place and the two bottles of oil were kindly sent to me by a Government officer. On examination you will find all the Khandeish specimens to be of a reddish-brown colour, and the kind of oil named *Motia,* is of a rather clear golden colour, resembling olive oil, and the *Sophia,* turbid or reddish, not white, as stated in the *Bombay Gazetteer.* There are also on the table specimens received faom Nasik, the inflorscence of which is of a beautiful admixture of bluish-white and reddish colour.

Now the question is whether the two varieties, blue and white, mentioned in the *Gazetteer*, are coloured red by age. It is probable that the same plant may bear inflorescence bluish-white and red at different stages of its growth, and the colour and density of its oil may vary according to the process of distillation employed, or according to the age at which the plant is cut.

It may also happen that instead of varieties there may be distinct species. Roxburgh, in his *Flora Indica,* describes an aromatic species under the name of *A. Iwarancusa.* Some botanists, however, think that this description applies partly to *A. laniger* and partly to *A. Schœnanthus.* Others believe that there is in Northern India a grass with white hairs, which, though closely allied to *A. Schœnanthus,* is a distinct species.

Flückiger and Hanbury, in describing in their Pharmacographia, p. 662, the uses of grass oil, say:—" Grass oils are much esteemed in India as external applications in rheumatism and other such affections ; *Rusa oil* is said to stimulate the growth of hair. Internally grass oil is sometimes administered as a carminative in colic, and an infusion of the leaves of lemon grass is prescribed as a diaphoretic and stimulant. In Europe and America the oils are used almost exclusively by the soap-makers and perfumers. The foliage of this large odoriferous species of *Andropogon* is used in India for thatching ; it is eaten voraciously by cattle, whose flesh and milk become flavoured with its strong aroma.

"But the most remarkable use made of any grass oil is that for adulterating *Attar of Rose* in European Turkey. The oil employed for the purpose is that of *A. Schœnanthus*, Linn., and it is a curious fact that its Hindustani name is closely similar in sound to the word *Rose*. Thus under the designation *Rusa, Rowsah, Rosa, Rose,* or *Roshé,* it is exported in large quantities from Bombay to the ports of Arabia, probably chiefly to Jeddah, whence it is carried to Turkey by the Mahomedan pilgrims. In Arabia and Turkey it appears under the name of *Idris Yaghi,* while in the Attar-producing districts of the Balkan it is known, at least to Europeans, as *Geranium oil* or *Palmarosa oil.* Before being mixed with attar, the oil is subjected to a certain preparation, which is accomplished by shaking it with water acidulated with lemon-juice, and then exposing it to the sun and air. By this process, recently described by Baur, the oil looses its penetrating after-smell, and acquires a pale straw colour. The optical and chemical differences between grass oil thus refined and of attar of roses are slight, and do not indicate a small admixture of the former. If grass oil is added largely to attar it will prevent its congealing."

Dr. Dymock, in his interesting work, "the Vegetable Materia Medica of Western India," says :—"The annual export of *Roosa oil* from Bombay to the Red Sea ports and Europe exceed 40,000 lbs.; it is much used by the Arabs and Turks as a hair oil. The Bombay dealers know nothing of its being used to adulterate Otto of Roses. In India sandal-wood is used for the purpose." The learned doctor makes no mention of the two varieties of *Roosha grass* and their oils described by the *Gazetteer*.

All the *Andropogons* mentioned hitherto belong, as you will perceive, to the section called *Cymbopogon*. There are, however, two other species also found in India which belong to the section *Gymnopogon,* one of these is *Andropogon muricatus.* This is a tall grass, plentiful in the moist plains of Southern India, particularly Bengal. The ancient rulers of the country appear to have levied an impost upon its cultivation. This grass is known on this side of India as *Valeru* and *Vala,* and is used in some provinces as a thatching material or as fodder. When young, it is eaten by buffaloes. The roots, named *Kaskas,* are used in making the fragrant fans and tatties. It is said that the roots are exported to Europe, where they are employed in perfumery, and they are used in India in cases of fever, in the form of an infusion, &c.

In the Jhang Settlement Report it is stated that its tough roots are used in making ropes, and also that the brush employed by the weavers for arranging the threads of the web-baskets are made of the stems. In Oudh a perfume called *Itar* is extracted and used medicinally. (See Dymock's "Vegetable Materia Medica" and Duthie's "Fodder Grasses," plate 24.)

All the *Andropogons* mentioned above have been described by various authors, but the following, as far as my knowledge and reading go, has not been described by any ; I have therefore named it *A. odoratus.*

It is known to the natives as *Gawat Wedi.* I came across it whilst arranging plants and dissecting spikelets of grasses for Dr. Lisboa.

Description.—Culm erect, 3—5 ft. high, sometimes branching from the lower part, glabrous ; nodes long bearded. Leaves lanceolate, cordate at the base, acute or acuminate, with a few long hairs; the lower cauline and radicle leaves long, the upper small, but their sheaths very long. Ligula small. Spikes numerous, erect, branched, pedicellate (the pedicel of the lower spikes longer), and congested at the end of a long peduncle without a sheathing bract and forming an erect, dense, ovoid panicle. The rachis, pedicel, and the spikes covered with long silky hairs. Spikelets nearly two lines long, of a purple colour, the sessile and the pedicellate nearly similar ; outer glume of the sessile spikelet rather thin, many-nerved, somewhat obtuse and covered with long silky hairs, with a pit in some spikelets of the same plant and absent in others; second glume as long as the first or a little longer, but broader, thin, and keeled ; third glume thinner and hyaline ; fourth glume smaller or an awn ½—1 inch long, with an hermaphrodite flower at the end of the pedicel. Pedicel of the pedicellate spikelet covered with white hairs, but the spikelet almost free of hairs. Outer glume stiff, with five or more nerves, not prominent, almost obtuse; second glume thinner, with three nerves, somewhat broader, but as long as the first ;

third glume hyaline, smaller; fourth glume very small, hyaline or none; no awn; at the top of the pedicel three stamens, not well formed and not as large as in the hermaphrodite flower.

This grass is common at Lanowli, on the right side of the station, in the fields beyond the woods, where it grows along with *Pollinia tristachya*, Thw., *Ischœmun laxum*, R. Brown, *Arondinacea Nepalensis*, Trim., and other annual grasses. The purple-coloured spikes of *A. odoratus* and *Pollinia tristachya*, congested at the end of long peduncles, form a most elegant and beautiful feature of the scenery of the field towards the end of the rainy season. It is said to be not uncommon at Khardi, Thana. I have found it in the collection received from this district.

From the description and from the specimen laid on the table, you will see that this *Andropogon* belongs to the section *Gymnopogon*, and is different from all other aromatic *Andropogons*, and as I believe it to be a new species, I have called it, as stated above, *A. odoratus*. The leaves and the inflorescence also, when pressed between the fingers, emit an odour altogether different. If you examine the small quantity of volatile oil, of a beautiful golden yellow colour, which is on the table in a tiny little glass-tube marked *A. odoratus*, and compare it with that of *A. Martini* in another similar tube, also on the table, extracted by Mr. Prebble of Messrs. Kemp & Co., you will certainly pronounce that the odour of the new species is soft, sweet, and more agreeable than that of *A. Martini*; and if it be manufactured on a large scale, with great care and by an improved process, if practicable, it may prove superior even to that of *A. nardus* and *A. citratus*.

Chemical analysis could not be undertaken, because the quantity of the oil extracted was too small for the purpose.

CORRESPONDENCE RELATING TO THE PROTECTION OF INSECTIVOROUS BIRDS IN THE INTERESTS OF AGRICULTURE.

Bengal Chamber of Commerce,
Calcutta, 31st January 1888.

No. 90 of 1888.

From S. E. J. Clarke, Esq.,
Secretary, Bengal Chamber of Commerce;
To Sir E. C. Buck, Kt., C. S.,
Secretary to the Government of India, Revenue and Agricultural Departments.

Sir,—The Committee of the Chamber of Commerce desire me to hand you copy of a letter, dated 5th January, from Mr. John Rudd Rainey, Zemindar of Khulna, and copy of the *Englishman* of 31st December, containing a report of a lecture delivered by him before the Agricultural and Horticultural Society of India. With reference to these papers, I am to say, that a reconsideration of Act XX. of 1887, "An Act for the Protection of Wild Birds and Game," for the more effectual protection, in the interests of Agriculture, of insectivorus birds would have the support of the Chamber of Commerce.— I have, &c.,

(Signed) S. E. J. Clarke,
Secretary.

From Jno. Rudd Rainey, Esq., F.R.G.S.,
Proprietor of Khulna Estate, Rainey Villa, Khulna;
To S. E. J. Clarke, Esq.,
Secretary to Bengal Chamber of Commerce, Calcutta.
Dated Rainey Villa, Khulna, the 5th January 1888.

Sir,—I have the honor to request that you will be good enough to submit for the consideration of the Bengal Chamber of Commerce the accompanying copy of the address delivered by me at a meeting of the Agri-Horticultural Society on the 29th ultimo, on the "*Effectual* protection of insectivorous birds in the interests of agriculture," and with reference, thereto, I beg to offer the following remarks :—

2. That in this essentially agricultural country, anything calculated to promote agricultural interests in it will, undoubtedly, advance the interests of the teeming millions, the tillers of the soil ; and as the Bengal Chamber of Commerce have always taken a deep interest in all matters concerning the welfare of the people of this country, and especially interested themselves in the interests of the vast body of agriculturists in times of famine and other calamities, I hope this influential body will support the good cause I am advocating, and make a representation to the Government of India on the subject, in order to move the Supreme Legislature to pass a more liberal measure in the all-important interest of agriculturists.

3. That as the Government, on account of financial embarrassment, have imposed taxes which are highly obnoxious to the masses, and notwithstanding the deservedly profound respect universally entertained towards the present head of the Supreme Government, it is straining the loyalty of the subject to the utmost extent, hence anything calculated to increase the agricultural prosperity of this country is also calculated to relieve the Government from this financial pressure.

4. That as His Excellency the Viceroy has always evinced his desire to follow on the lines of the agricultural policy of his distinguished predecessor and late lamented countryman, the Earl of Mayo, we have every confidence that any fitting representation made to him regarding any legislating measure being re-cast, in order to avert such terrible calamities as famines and the enormous misery resulting therefrom, would not fail to meet with the consideration that this important subject deserves.

5. In conclusion, I have to say that I do not speak on this matter only as a sportsman and naturalist, but also as an extensive landholder in Bengal, whose

practical experience of Agircultural questions extends over a period of more than a quarter of a century.—I have, &c.

(Signed) John Rudd Rainey.

(True copy.)
J. E. S. Clarke,
Secretary.

(True copy.)
G. A. Andrews,
Registrar,
Revenue and Agricltural Department.

THE PROTECTION OF INSECTIVOROUS BIRDS.

At a meeting of the Agri-Horticultural Society on Thursday, Mr. Jno. Rudd Rainey, F.R.G.S., delivered an address on the "Effectual protection of insectivorous birds in the interests of agriculture." He said:—As this Society has, ever since its foundation, extending over a period of well nigh three score and ten years, been foremost in bringing forward and discussing all subjects likely in any way to promote agricultural interests in this country, as well as advocating such measures as are calculated to prove conducive thereto, hence I venture, as a member of it, to introduce this by no means unimportant subject to their notice with the view of inviting a discussion upon it at this meeting, and persuading the Society to move the Government to pass an enactment for the *effectual* protection of insectivorous birds in the interest of agriculture. I am more especially induced to do so now, as the recent promulgation of a legislative enactment (Act No. XX. of 1887), entitled "An Act for the Protection of Wild Birds and Game," fully recognises the fact that the destruction of insectivorous birds injuriously affects agriculture, and endeavours to mitigate the evil, but not to any appreciable extent. This, of course, is not sufficient. The utter extermination of insectivorous birds will, no doubt, be thereby prevented but what is really wanted is something more,—the *effectual* protection from destruction of these useful, nay, valuable, birds to agriculturists.

In America, to quote from the " Report of the Commissioner of Agriculture" for 1870, p. 510, " The laws passed in 1859 and 1860 to protect wild game from indiscriminate slaughter, and to prevent the reckless killing of insectivorous birds, gave great satisfaction. Farmers and fruit-growers believe in the wisdom of these laws, and are determined they shall not be violated with impunity."

It being now an admitted and well-known fact, that insectivorous birds are the best friends of agriculturists, it is therefore altogether unnecessary for me to lay any stress upon this point. But it may be stated that, in India, where insects are so various, numerous, and prolific, the destruction they commit on growing and ripening crops is simply incalculable, so much so that a stipulation is sometimes inserted in agricultural leases to the effect that no reduction of rent on account of destruction of crops by insects will be allowed.

To anticipate any argument that may be advanced regarding certain insects being not only harmless, but absolutely useful to crops, I may here state that I am not unmindful of the fact now well known to Botanists, thanks to Sprengel, who, towards the end of the past century, ennunciated his ideas on the connexion of flowers and insects, that some insects are useful for the fertilisation of flowers, and in a few cases the latter are absolutely indebted to insects for their propagation; the red clover, for instance, would not produce any seed at all if it were not for the good offices of the humble bee, which, being provided with an elongated proboscis, is able to effect an entrance into the flower to extract the nectar, and thus carries with it the pollen, which is inserted in the flower next visited by it. And with reference to this, who amongst us, I ask, has not read the following beautiful lines of Cowper in his "Task, The Garden"?

> "Large foliage, overshadowing golden flowers,
> Blown on the summit of the apparent fruit.
> These have their sexes, and when summer shines
> *The bee transports the fertilizing meal*
> *From flower to flower*, and even the breathing air
> Wafts the rich prize to its apparent use."

But while the function of the nectar or honey generated in the flower is doubtless designed by Nature to allure insects, and thereby to insure cross fertilisation, as just pointed out, by far the greater number of species of insects do not subsist simply on this saccharine secretion; they feed on the tender leaves and flowers, and imbibe the very life-blood or sap of the growing plants, as well as devour the seed while yet in its embryotic state, which often, in the case of the rice-crop, for instance, causes a partial failure of this food-grain, and contributes to some extent to scarcity and famine. For instance, the *sis poka*, whenever there is cloudy weather, attacks the paddy crops and causes great injury by eating the sis or "ear" of the paddy grain, whence it derives its name. Next the *mau poka* or "honey insect," which devours the seed in its embryotic state, and leaves no grain at all, but only the husk or chaff,—not *cum grano salis*, as I speak from an extensive personal experience; I hope I do not tire your patience, but may be permitted to relate here an amusing illustration of this fact. A late Lieutenant-Governor of Bengal, the versatile Sir Richard Temple, mentioned to me some years ago, on his arrival at Khulna after his inspection of that tract of country in Eastern Bengal, which was then devastated by the cylcone, that the Deputy Magistrate, Bagerhat had informed him, that the reason of the paddy that season being in certain parts of his sub-division all in husk and having no grain, was owing to these insects having, as he expressed it, "drunk up the milk of the seed of the rice-crops there": Sir Richard, of course, was at a loss to understand what was really meant, when I explained to him what I have above shewn.

Perhaps some persons may be inclined to think that the preservation of insectivorous birds would result in the total extermination of all insects, useful and destructive alike, so I may point out that Nature, in her wise provision for the protection of all things created, has happily provided against such a contingency, by supplying to those insects most exposed to danger from birds, forms and colours assimilating to the plants on which they are found, and that they thus obtain some appreciable protection from their enemies of the feathered tribe: the most striking illustrations of insects being in some measure insured against danger by their similarity to plants are of course those of grasshoppers walking leaf-insects (genus *Phyllium* of Entomologists), and the various members of the curious family *Phasmidæ*, all common to this country.

Now, taking it for granted, that the preservation of insectivorous birds is necessary in the interests of Agriculture,—for the Legislature has even acknowledged this fact—let us proceed to consider whether the measures adopted are adequate for the purpose or not. In order to do so it will be necessary to refer to the speech of the Hon. Mr. Scoble, the Legal Member in Council, when moving for the Bill introduced by him to be considered and passed, as well as to refer to the provisions of the Bill itself.

At a Meeting of the Supreme Council, held at Simla on the 20th October last, the Hon. Mr. Scoble said, "a general consensus of opinion was in favour" of the Bill, and that "where objection has been taken, it has been, not to the principle of the Bill, but that it does not go far enough," which clearly demonstrate that although legislation on the subject was most opportune, it might, in fact, ought to have gone a good deal further than it actually did. He then went on to say: "We have endeavoured to meet this objection to some extent," and no doubt so, but altogether insufficiently. That the Bill "will also admit of protection being given to insectivorous birds" is no doubt correct, but to so very limited an extent that it certainly will not, as the Hon. Member contended, "sufficiently" protect agricultural interests, "by empowering Municipal and Cantonment authorities to make rules, fixing a close season for any kind of wild birds, and imposing a penalty on the possession or sale of such birds," of course, only within such limits.

The Act *per se* is very simple and brief, containing no more than four sections in all, and the penalties imposed for any breach of the rules framed under its provisions are by no means severe, only small fines being leviable in respect thereof. But such as they are, they would no doubt adequately act as a deterrent, if the limits within which the rules are to have force were extended to the whole of British India, and not merely confined to the areas of the different Municipalities and Cantonments comprised therein. Within such areas there is little land under cultivation as a rule, and to prevent the destruction of insectivorous birds in them will be of little benefit to agriculturists generally throughout British India.

Again, the Hon. Mr. Scoble in his speech, already adverted to and quoted in some parts, says—

"As this is a tentative measure, we have not thought it desirable to give District Boards the powers conferred by it on Municipal and Cantonment authorities."

But, at least as regards insectivorous birds, why should the Act be considered a *tentative* measure? These birds, it cannot be gainsaid, do a vast deal of good to agriculturists in protecting their crops from the ravages of destructive insects, and while "the rural population are"—to quote the words of the Lieutenant-Governor of the Panjab cited by the Legal Member—"sorry to see them destroyed, the only persons interested in the trade are the exporters, and a few professional netters and snarers employed by them." Are the interests, then, of the vast body of agriculturists in this essentially agricultural country to be sacrificed to this limited and significant class? There can be but one answer to this question, and that, of course, an emphatic negative. It thus behoves the

Government, in the interest of the teeming millions, the tillers of the soil, to extend the provisions of the Act throughout the length and breadth of India.

I hope that what I have here advanced will induce the Society to make a fitting representation to the Government on the subject, in order to move the Supreme Legislature to pass a more liberal measure in the all-important interest of agriculturists.

No. 1014 of 1888.

General Department;
Bombay Castle, 28*th March* 1888.

Forwarded to the Director of Land Records and Agriculture for the favour of report.

J. DeC. Atkins,
Under-Secretary to Government.

No. 807 of 1888.

Poona, 8*th May* 1888.

Report.

The important point to clear up is, it appears to me, what game birds or birds used for food are insectivorous. I regret I am unable to furnish this information on which I think depends for its utility any opinion that can be given. My own impression is that the birds which are usually *shot* are either graminivorous, such as, I believe, partridge, rock-grouse, quail, or if not graminivorous, as wild duck and snipe, are not purely insectivorous, or at any rate do not make their preservation of much assistance to the agriculturists. What birds are *snared* I do not know. Accurate information on these points would, no doubt, be given by Mr. G. W. Vidal, C. S.

2. It appears, however, that the application of the Act even in municipalities and cantonments only, will do more to check indiscriminate slaughter than is thought by the writer of the paper in the *Englishman*. His remark that the agricultural area within cantonment or municipal limits is trifling, misses the point. The game sold in towns or cantonmnts is brought from areas far outside the civic limits, in fact, very seldom from within them. Enforcement of the Act will therefore, I think, give some protection to wild birds over an appreciably wide agricultural area.

3. But as regards cantonments especially, the existing provisions are not sufficient. The checking of sale will not stop soldiers, for instance, shooting in the breeding season. This can be stopped best by a system of licenses—not to be granted during close season.

4. Without the information specified in para. 1, I can give no opinion regarding the extension of the power to Local Boards. The conferring of such powers would at least be popular in certain localities, for instance, in parts of Gujarat, where Jain feeling is strong.

5. I am, however, strongly of opinion that no more should be done than the mere prohibition of sale and restriction by license.

J. MUIR MACKENZIE,
Acting Director, Land Records and Agriculture.

No. 1615 of 1888.

GENERAL DEPARTMENT;
Bombay Castle, 16*th May*, 1888.

Forwarded to Mr. G. W. Vidal, C.S., for favour of information upon the points specified in para. 1 of the Memo. No. 807, dated 8th May 1888, from the Director of Land Records and Agriculture.

E. LAWRENCE,
Acting Under-Secretary to Government.

No. 6192.

Poona, 28*th September* 1888.

In returning the above correspondence, the undersigned has the honour to express his regret for the delay which has occurred in answering the reference made to him.

2. As far as Mr. Vidal's experience goes, no insectivorous birds are snared on this side of India, the preservation of which can confidently be declared to be necessary in the interests of agriculture. Most of the birds which are snared to any considerable extent, leaving purely aquatic birds out of consideration, are graminivorous birds, such as partridge (including the common grey partridge and the painted francolin), peafowl, sand grouse, quails (including the grey quail, the rain quail, the bustard and button quails, and two or more species of bush quail or dwarf partridge); bustards and florikins, which are more insectivorous than graminivorous, are also ruthlessly snared wherever they can be found. But these together with the birds above mentioned will all presumably receive partial protection under Act XX. of 1887.

3. If the undersigned may venture te express an opinion on the general question raised in the correspondence, no sufficiently exact knowledge is at present available, (1) as to the particular insects whose destruction is needed, or (2) as to the particular species of birds whose services can be counted on to fulfil the desired object, to make any special action in the matter other than a blind experiment.

4. Mr. Rainey, it will be observed, has not even attempted to name the species of birds whose special preservation in the interests of agriculture he considers necessary, and Mr. Vidal doubts very much if any one living could supply this omission. Great numbers of the birds whose chief *habitat* is found in highly cultivated tracts are graminivorus, as well as insectivorous. As a matter of fact, such birds are not snared in such quantities as to upset the balance of nature, or to have any appreciable effect on agriculture. But assuming that special protection of such birds would reduce the damage done by insect pests, these

birds with their numbers increased, and the supply of insect food proportionately diminished, might prove quite as destructive to the crops as the insects they had exterminated, and it would be difficult to decide on which side the balance of advantage to the cultivators would lie.

5. For instance, the rosy pastor is a well-known destroyer of locusts, and at the same time he is himself a rapacious consumer of millet ; should he be specially preserved or specially destroyed ?

6. The obvious conclusion, in the opinion of the undersigned, is that the special protection of such birds in the interests of agriculture would be just as likely, if it had any effect at all, to do harm as good.

G. W. VIDAL,
Collector of Poona.

MEMORANDUM ON AN OUTBREAK OF SURRA FEVER AT THE STABLES OF THE BOMBAY TRAMWAY COMPANY, LIMITED.

BY F. C. RIMINGTON.

ATTACHED hereto is a statement giving particulars of 14 horses belonging to the stud of the Bombay Tramway Company, which were attacked with Surra Fever in the months of November and December 1888. In addition to the record of the outbreak supplied in that statement by our Veterinary Surgeon, we think it well to add a few remarks :—

Locality and Description of the Stables.—It will be observed that of the 14 cases of surra, 10 cases have come from the Company's *Parel* Stables. That stable was constructed in 1886, with accommodation for 174 horses, and the actual average number of horses kept there during the two months, when the outbreak prevailed, was 174. The stables are situated on the Parel Road in the northern and most inland quarter of Bombay. They are bounded on the north by an enclosure about 5,000 sq. yards in area, which is used as a vegetable market, and skirted on three sides by lines of brick-built chawls ; on the south by an open space reserved for purposes of a proposed new station by the G. I. P. Railway Company ; on the east by the Parel Road, on the other side of which are the Victoria Gardens; and on the west by the G. I. P. Railway track, beyond which again, for some distance, there is open land. About 2,000 ft. from the stables the Flats commence : open, low-lying vacant land which extends for several miles, and the greater portion of which is under water during the monsoon. For the 2½ years the stable has been in use, there has, up to last November, hardly been a single case of fever there. The stables are splendidly ventilated. The drainage is on the surface system, and could not, we believe, be better. The stalls and all the stable fittings are kept most scrupulously clean. Bad smells are unknown. The temperature at Parel generally ranges 2° lower than at Colaba, especially at night. The *Colaba Stables* are situated in the Colaba Causeway. To the north is a large piece of *maidan*, belonging to Government, sometimes submerged during the monsoon for a few days at a time; to the south are Goods stations and yards belonging to the two Railway Companies; to the east, the Colaba Causeway road, with the sea about 600 feet beyond; to the west, open *maidan* with the sea distant about 1,000 ft. The average number of horses stabled at Colaba during November and December was 574. The drainage of the stable is inferior to that at Parel, being on an underground system. Great care is, however, taken in flushing the drains, and keeeping the premises scrupulously clean. The ventilation of the stables is good. Fever has often been prevalent in these stables in October and November, but the number of fatal cases has been few, and the disease has usually disappeared as soon as the " cold weather " set in.

To sum up: the number of horses kept at *Parel* is less than one-third of that kept at *Colaba*; the interior sanitary arrangements at the former are superior to those at the latter; the record of fever cases at the former has, up to November last, compared most favourably with that at the latter; the temperature at the former averages 2° lower than at the latter. Notwithstanding all these facts to the credit of Parel, 10 horses have been attacked there during the recent outbreak of surra, against 4 horses attacked at Colaba Stables.

Feed and Water-supply.—(*a*) FEED. The Company's horses get from 12 lbs. to 15 lbs. grain per day, according to size. The majority of the horses attacked with " surra " fever were horses receiving 15 lbs. grain-feed. The feed in question was composed of a mixture of 8 parts, viz., 3 parts gram, 3 parts barley, 1 part koolti (boiled), and 1 part Indian-corn. Their hay-feed was 12 lbs. per diem. The hay is grown on black soil in Guzerat. Like all Indian hay it is jungle hay, not raised on drained land. The grasses we prefer and chiefly employ for hay are Mosi, Daroia, and Zinjva (known in the Deccan as "Sheera"). From August to middle of October, in accordance with our custom for many years past, the horses received from 2 lbs. to 4 lbs. green grass daily, grown in the neighbourhood of Bombay. They also receive daily 1 lb. bran and 1½ oz. salt.

(*b*) WATER. The water used in the stables and everywhere on our lines is all from the Municipal Reservoirs at Vehar and Tulsi; Colaba stable is supplied with Tulsi water, and Parel stable with Vehar water. We had the water used at the latter stable and at the watering stations on the line near there analysed by the Government analyst, Dr. Lyon. The following is his report upon it:—

"*Statement showing the results obtained on examination of four samples of water forwarded December 18th, 1888, by the Superintendent, Parel Stables, Bombay Tramway Co.*

"Samples labelled—

No. 1. Parel Terminus.
No. 2. Parel Stable.
No. 3. Byculla Bridge, N. Side.
No. 4. Byculla Bridge, S. Side.

	1	2	3	4
Grains per gallon.				
Total Solids	7·70	8·40	6·30	4·20
Chlorine	·91	·91	...	·84
Parts per million.				
Free Ammonia	·04	·02	·02	·02
Albumenoid Ammonia	·19	·18	·21	·17

"*Sediments.*—In all scanty, chiefly vegetable *débris*. A few "paramonia in No. 1.

"From these results all four appear to be samples of water very "similar in quality to the ordinary Vehar supply of Bombay. "The Albumenoid ammonia results are perhaps very slightly higher "indicating slightly more organic contamination. Were the case "one of an outbreak of fever among human beings, I should say "that it was very improbable that any connection existed between "the outbreak and the water supply."

Climatic Conditions last Year.—The monsoon last year was an unusually light one, the aggregate rainfall being 59 inches against an average of 75 inches. In September scarcely any rain fell, the total fall registered that month amounting to 3½ inches only. There was no rain in October, and the temperature which throughout the month was unusually high, touched a maximum of 93° in the shade. Early in October portions of the city were visited with a mosquito plague. The innumerable quantity of these insects in the air indicated something unusual in the climatic conditions, or in the condition of the marshes which skirt Bombay. The weather commenced to get cooler in November, and in the middle of December cold N.-E. and N.-W. winds set in and have since continued, the former blowing during the night and the latter during the day.

Breed of the Horses attacked.—The Company had last October a stud of 739 horses; of these 570 were Australians, and 169 horses of Asiatic breeds. Of the 14 horses attacked with "surra" in November and December, 13 were Australians, and 1 was a Persian. The majority were young horses, well bred, and in excellent condition.

The Symptoms and Course of the Disease.—As a rule the presence of the disease was first detected by the horse going off feed, and looking dejected and weak. An eruption of Urticaria was found on the skin in a few cases. On examining the animal the pulse was found high, generally 50° to 60°, the temperature 102° to 104°, and the lungs, usually, and heart sometimes, affected. If a gelding there was often some slight swelling of the sheath. The membrane was invariably a pale yellowish grey colour, and the anus in some cases extremely relaxed. In a few cases, but not in all, a few blood spots were observable on the membrane of the eye. As a rule when treated with fever medicines and antiseptics, the horse quickly improved, the temperature falling to 100°, to 101°, and the appetite returning. The swelling of the sheath did not, however, in any case entirely subside, and the pulse continued high. The horse would remain in this improved condition for a few days, eating well and looking well. A relapse would then set in, the temperature again rising to 103°, to 104°, or occasionally higher, dropsical swellings would appear along the abdomen, and especially between the forelegs. The horse, although feeding well, would now commence to lose condition. In many cases renewed trouble would be observed at the lungs and heart. The majority of the horses attacked exhibited these alternate improvements and relapses, the animals wasting gradually away, until utterly worn out. In two cases, however, death ensued four days after the disease had declared itself. In these cases the affection of the lungs was extremely severe, the horse would hardly feed at all, and the whole appearance of the animal was very distressed. One horse attacked with the disease, a rather coarse-bred Waler, in very fine condition, lost flesh but slightly before death. The specific "surra" microbe was found in the blood of this animal by Mr. Pottinger, A. V. D. The same gentleman examined microscopically the blood of some of the other cases, and was generally successful in finding the microbe, but not invariably so. The results of the *post-mortem* examination are given in the Veterinary record of the cases hereto attached. In all these *post-mortems* the black colour of the blood was a very noticeable feature.

The Treatment adopted.—The system of treatment adpoted in the majority of cases was that recommended by Mr. Pottinger, and consisted of ℥ii Hyposulphite of Soda and ʒi Nitrate of Potash given in the drinking water; 30 drops of Carbolic Acid in ℥i Rectified Spirits given three time daily as a draught. We also tried Arsenic, Aconite, and Sulphate of Quinine in large doses. We cannot claim for any of these medicines that they seemed to exercise any control over the disease. Certainly they did not arrest its course. Every horse attacked with "surra" has either died or had to be destroyed. As a precautionary measure we isolated the horses suffering from it.

Preventive Measures adopted.—As soon as we were satisfied that "surra" had appeared amongst our horses, and that the causes producing it seemed in especial force at our Parel stables, we carried out a most careful and thorough examination of the watering and drainage arrangements at that stable. The results of the examination of the water have been given above. The stable drainage was found in good order, no stoppage anywhere; all drains clean and free from smell. A drain in the neighbouring property to the north was, we found, not working well, and we had it attended to. We disinfected the stables throughout on more than one occasion with phenyle and water, 1 part to 50, sending showers of it through the air in every direction from a manual fire engine, and thoroughly drenching the roof and stable fittings. Carbolic powder was also sprinkled in all the stalls, and sulphur and tar burnt in braziers in the passage ways. We noticed that the majority of the horses attacked had been standing in portions of the stable most exposed to the N.-W. and N.-E. winds, and that it was since those winds had turned cold in the evening and at night that the outbreak of " surra " had occurred. With a view to obtaining thorough ventilation in the hot weather our stables at Parel are very open in their construction, and although the venetians, with which the sides are fitted, are closed at night, it occurred to us that at certain places the horses were more exposed than they should be to the night winds. To provide against this, we effectually protected the horses from all apertures whence these winds could enter and blow upon them, and considerably increased the warmth of the stables at night by the erection of bamboo and matting screens across the principal entrances. We also gave all the horses standing at Parel a light course of antiseptic medicine. For three days each horse had daily ʒii Hyposulphite of Soda and ʒi Nitrate of Potash mixed with his evening grain feed. These preventive measures were carried out the latter part of December. It was during the last week of that month that we set up the screens, &c., which effectually protected the horses at Parel from cold winds. Simultaneously we introduced stringent regulations at Colaba for the complete protection of the horses there, and maintenance of a more even temperature in the stables at night. Since the 1st January we have so far had no fresh case of " surra."

Possible Causes of the Outbreak.—The professional opinioin as to the source of " surra " expressed by the Government Veterinary officers, Mr. Burke, Mr. Evans, and Mr. Steel, in their treatises on this disease is that the parasites which give rise to it enter the horse's system either with his food or his water. In the Company's stables, the water-supply, pronounced a pure and wholesome one by the Government analyst, is the same as has been in use for several years past, and no alteration has been introduced into the character of the grain and hay feed. The drainage of the Parel stable, where two-thirds of the " surra " cases occurred, is exceptionally good, much better than the drainage at Colaba stable. Immediately to the rear of stables at Parel there is a depôt for manure. The dung both from Colaba and Parel is transported there. Thence it is daily removed by carts. A portion of it remains there throughout the night, but none of it remains there longer than the morning subsequent to the day of its receipt. At our old stables at Byculla a similar depôt existed, but the manure remained there for three days before removal. At neither stable has the existence of this depôt heretofore been a cause of unhealthiness. The fever record of the Parel stables for the two years of their existence prior to last autumn has been an extremely satisfactory one, very much more favourable than the record at Colaba. We cannot therefore find anything in the feeding of the horses, their watering, or the drainage of their stables, which would account for the outbreak. All these conditions, in so far as they affect the horses' health, have been, to the best of our belief, precisely the same these last four months as during the many past years when "surra" was unknown to us. We therefore seem directed to seek in some special climatic and atmospheric conditions for the explanation of the outbreak. October and November last were notoriously exceptionally unhealthy months in Bombay. Malarial and typhoid fevers were prevalent, and many cases ended fatally. Unusually unhealthy months for human beings, they would appear to have been usually unhealthy for horses also. The outbreak of "surra" fever was not confined to the Company's stables. Several horses attacked with it were sent to the Governmen Veterinary Hospital, and others to the private Veterinary establishments in the city. Probably, a far larger number died in their owner's stables. Amongst the cases observed we have not heard of a single recovery. Taking all the above facts into consideration, the opinion we have been led to form is that there was some specially unhealthy influence in the atmospheric conditions this last autumn, which predisposed horses to this particular blood-poisoning fever, and that the specific cause which developed the disease into activity in the horses attacked with it was getting chilled from exposure to the cold northerly winds which during the latter half of November and the month of December blew in the evening and at night. This is the conclusion to which we have been led as the result of our own experience of the disease. In support of this opinion we have the following facts:—(1) that the horses attacked were found to have been especially exposed to cold night winds by their position in the stables, or nature of their work. At Parel stables, where the majority of cases occurred, alterations in the buildings were in progress. The south wall of the stable had been taken down in order to increase the number of stalls in that direction. This open condition of the premises on that side, while it did not expose the horses to any unwholesome wind (the south wind only blowing in the monsoon time, and being a warm one) tended no doubt to increase the draught through the stables from the north, and to lower their temperature at night. (2) That since the time when we introduced measures for protecting the stables from the northerly winds (a period of five weeks), no fresh case of "surra" has occurred. The last case at Parel stables appeared on the 29th December. It was on the 30th of that month that we completed the arrangements for excluding cold winds. (3) That the Parel stables, where nearly three-fourths of the cases occurred, were, until recently, in consequence of their system of construction, more open and considerably colder than the stables at Colaba. (4) That there is nothing ascertainable in the feeding or watering of the horses, differing from the feeding or watering during previous years when "surra" was unknown to us, which can, in our opinion, in any way account for the outbreak.

In connection with the exposure of the horses to cold winds and our opinion that chill to the system therefrom resulting was the immediate factor producing activity in the disease, we may mention that out of 8 horses working as "helping" horses on the Byculla Bridge, no less than 3 were attacked with "surra," and of these 2 were attacked upon the same day. Compared with the work most of our horses do, the work of these particular horses was light, and they were in specially good condition and of exceptionally fine physique. These horses are attached as additional horses to help in pulling cars up the inclines on the Bridge. After pulling up a car they return to the little waiting-sheds provided for them at either end of the Bridge, and stand, usually about 5 minutes, until another car approaches. On examining these sheds, we found them a good deal exposed to the north wind. We have now protected them; but it is easy to understand how in the early morning, or between 7 p. m. and 11 p. m. at night, these horses, after getting warm at their work, would be specially liable to chill when standing waiting in sheds, until recently not very well protected from cold winds.

In the plains of America it has been noticed that in certain thinly populated districts where fever was prevalent, the introduction of railway tracks and the passage of trains has modified the sanitary conditions. The theory in explanation of this fact is that the displacement of air caused by the rapid passage of the train creates a vacuum and consequent draught, and that a rush of fresh air is in this way introduced. In other words, the train produces a sort of artificial wind. The track of the G. I. P. Railway passes immediately behind our Parel premises, distant only 75 feet from the stables. About 2,000 feet further to the north the Flats commence, and are crossed by the trains. In this memorandum we are anxious to enumerate all possible influences which may have shared in the production of the recent outbreak of "surra." It is perhaps worthy of consideration whether the G. I. P. Railway track, which very shortly after leaving the marshy land of the Flats, passes our Parel stables on their N.-W. side, does not act as an air-channel from the one to the other. The line of horses standing next to the railway was the line in which the "surra" was by far the most prevalent.

A conjecture has been put forward by some Veterinary authorities in India that there is a connection between "surra" and rats. A parasite has been found in the intestines of rats which is similar to the parasite noticed in the blood of horses suffering from "surra." It is suggested that where rats have access to grain, it becomes contaminated with their excreta, and that when used for horses' feed the parasite may in that way be conveyed into the horses' stomachs. In view of this theory we think it right to mention that although the greater portion of our grain is kept in paved godowns, and we do our best to exclude rats, yet we know that both before and after the grain is received by us rats do frequently get at it. But before our grain is used for horses' feed it is carefully cleaned, both by hand and through a machine. We ourselves cannot, from our own observation, favour the rat-infection theory. If the source of the disease is due to grain getting mixed with the excreta of rats, why is the appearance of the fever limited to certain seasons, and why should it appear only in certain years? For the past 14 years it has been unknown in our stables, and during those years our stocks of grain and hay have been less well protected from the incursions of rats than they have been the past 12 months.

We have now we think exhausted all we are in a position to state with regard to our own experience of "surra" fever. We submit these few remarks on a veterinary subject as proceeding of course from a non-professional pen, and while we trust to be pardoned any mistakes into which we may in consequence have fallen, we hope that our experience may be of value to those who are making this disease a subject of special study. As a large owner of horses, this Company is deeply interested in researches which have for their object the discovery of a remedy for this most fatal form of equine fever.

Bombay, 7th February 1889.

Veterinary Report on 14 Cases of Surra Fever in the Bombay Tramway Company.

Age.	Breed.	Sex.	Date when attacked with Surra.	Treatment pursued.	Died or destroyed.	Results of *Post-mortem.*
			1888.			
16	Australian.	Gelding.	Oct. 18	Fever draughts and Sulph. Magnesia and fever balls.	Died 3-11-88.	Lungs found diseased.
11	Do. ...	Mare ...	„ 21	Fever draughts, fever balls Also 1 oz. Hyposulph. Soda, ½ oz. Pot. Nitras. water, 30 drops Carbolic Acid. (3 times daily in 1 oz. Spts. of Wine), Sulph. Quinine.	Died 4-12-88.	Lungs found diseased; blood impure.
8	Do. ...	Gelding.	„ 31	Fever balls, fever draughts, and alt. balls. Sulph. Quinine.	Died 26-11-88.	Lungs and heart found diseased; blood impure.
11	Do. ...	Do. ...	Nov. 6	Fever draughts, fever balls Also 1 oz. Hyposulph. Soda, ½ oz. Pot. Nitras, water, 30 drops Carbolic Acid. (3 times daily in 1 oz. Spts. of Wine). Sulph. Quinine.	Died 2-12-88.	Lungs found diseased; blood impure.
8	Do. ...	Do. ...	„ 12	Fever balls (½ dram), Digitalis, fever draughts.	Died 25-11-88.	Lungs found diseased.
11	Do. ...	Mare ...	„ 18	Fever draughts & Aconite.	Died 21-11-88.	Lungs heart, and kidneys found diseased.
11	Persian ..	Gelding.	„ 19	Fever balls and draughts, alt. and ton. balls Hyposulph. Soda, Pot. Nit., and Carb. Acid as above.	Died 10-1-89.	Lungs found very much diseased; kidneys slight, all other organs all right; all membranes pale.
11	Australian.	Do. ...	Dec. 11	Fever draughts...............	Died 15-12-88.	Lungs found diseased.
11	Do. ...	Do. ...	„ 16	Fever balls and draughts, alt. and ton. balls. Hyposulph. Soda, Pot. Nit., Carb. Acid and 3 grs. Arsenic (twice daily).	Died 14-1-89.	Lungs very much diseased; blood very impure.
9	Do. ...	Mare ...	„ 16	Fever balls, 1 oz. Hyposulph. Soda and ½ oz. Pot. Nit., 30 drops Carb. Acid (3 times daily).	Died 4-12-88.	Heart, lungs, and liver found diseased; blood impure.
6	Do. ...	Do. ...	„ 17	Fever and stimulating draughts fever and ton. balls.	Destroyed 16-1-89.	Lungs shrunk and tubercled; stomach and large intestines very much inflamed; liver enlarged and sodden; heart very much diseased; blood impure.
16	Do. ..	Gelding.	„ 17	Fever balls, 1 oz. Hyposulph. Soda and ½ oz. Pot. Nit., 80 drops Carb. Acid. (3 times daily).	Destroyed 22-12-88	Lungs, liver, and heart found diseased; blood impure.
12	Do. ...	Mare ..	„ 23	Fever balls and 3 grs. Arsenic (twice daily).	Died 13-1-89.	Lungs very much diseased; liver hard and congested; stomach a little inflamed; muscles all wasted, and blood impure.
8	Do. ...	Gelding.	„ 29	Fever balls and draughts, alt. and ton. balls, Hyposulph. Soda, Pot. Nit., Carb. Acid and 3 grs. Arsenic (twice daily).	Destroyed. 16-1-89.	Blood dirty and dark; stomach a little inflamed and large; intestines very much; lungs slightly diseased.

J. T. RODGERS, V. S., in Veterinary charge.

RECORDED INSTANCES OF CHILDREN HAVING BEEN NOURISHED BY WOLVES AND BIRDS OF PREY.

By Jivanji Jamshedji Modi.

(*Read at the Society's Meeting on 7th May* 1889.)

The wolf is, as its very name shows, a ferocious and blood-thirsty animal. The word is the same as the Sanscrit Vrka (Z. Veherka Pe and P gurg and *Lat.* Vulpes), and comes from an old Aryan root, vracc, (व्रच्छ), to tear off. Though by nature a ferocious animal as implied by the root of the word, it is susceptible of entertaining towards mankind maternal or human feelings. This paper is intended to describe a case of this tender feeling as recorded in India, and to state a few similar cases, as narrated in old classical literature, of wolves and birds of prey.

I was travelling in Northern India in the early part of 1887, and when I was at Agra at the end of March, I was attracted to a place known as the Secundra, which contained a tomb of Mariam, a Christian wife of the great Akbar, who had, in accordance with his views, of tolerating different religions, taken to his harem wives of different nationalities. I went there to see if there was anything specially Christian in the tomb of that queen, as there was something specially Hindoo in the royal chambers of his Hindoo wife at Fatehpur Sikri. Though I saw nothing there specially Christian, I was delighted with my visit to that place, as I saw there a man who was generally known as the wolf-boy. A boy of the Secundra Church Mission Orphanage, which is located there, drew my attention to this man, whose history reminded me of what I had read in classical literature of ferocious and blood-thirsty animals turning at times tender and kind-hearted. I will describe the history of this boy in the words of the Rev. Mr. Lewis, who published a short history of the Secundra Orphanage in 1885. He says of this boy:—"On February 4th, 1867, he was sent to the Superintendent of the Orphanage by the Magistrate of Bulandshahr, with the statement that he had been taken out of a wolf's hole or den. Some natives, it turned out on further enquiry, had been travelling by some unfrequented part of the jungle in the Bulandshahr district and had been surprised to see a small boy, of five or six years of age, walking about on his hands and feet. On drawing near to see this strange sight, they were amazed to see the boy disappear quickly within the interior of a large hole, which, on close inspection, turned out to be the dwelling-place of some wild beast. Finding that all efforts to unearth the boy were fruitless, and fearing to venture in after him, they set off to report the unusual occurrence to the Magistrate Saheb of Bulandshahr. This gentleman on hearing the story despatched messengers to the spot, with instructions to light a fire at the mouth of the cave, so as to force out the occupant of the hole by means of the smoke. This was done, and on the blinding and choking fumes making their way into the furthest corner of the hole, a fine snarling she-wolf sprang forth with a bound, and after scattering the bystanders in considerable terror, rushed away for safety and dear life. A moment later the boy too came forth, when he fell an easy prey to those intent on securing him. On conveying him to the Magistrate, the boy was found to be speechless, imbecile, and as near an approach to an animal as a human creature can possibly be. Vegetable food was offered to him ; but this he refused. And it was only when meat was placed before him that he would eat. Finding it impossible to ever make the boy rational and useful, the Magistrate forwarded him to Secundra, with the request that he might be allowed an asylum there."

This is the short history of the boy as given in the book referred to. Though wanting in the most ordinary intelligence, he seemed to be sensible of many things. He is reported, in the book in question, to be sociable and unselfish, and "always willing to share his numerous gifts with any one caring to have them." Owing to the lateness of age at which he was brought to the Orphanage he could not be taught to speak, though the attempts of the authorities of the Orphanage in other respects have been successful. At the time when I saw him he was asked by a boy of the Orphanage, by means of signs, to walk like a wolf. He did so on his hands and feet. Then he made me some signs which were interpreted to me as a desire to have some money for smoking cheroots, of which I was told he was very fond. At the time when he was first brought to the Orphanage he walked like an animal on his hands and feet, but he was soon taught to walk erect. At first he did not allow clothes to be put on him. He tore and threw them away ; however, he was soon brought round to the use of these. His desire for raw meat only as food was gradually subdued for that of vegetables and ordinary cooked food. He is very ugly in appearance. It is supposed that the boy must have come across the path of a she-wolf, and that she, having lost her young ones, treated him with motherly kindness and care in place of her little ones; or that she must have stolen the boy from the side of his mother, as is very frequently the case in the poor cottages of many villages in the North-Western Provinces, and then, instead of devouring him, must have entertained some attachment for him.

The Rev. Mr. Lewis says that the Secundra Orphanage has been the home of two other wolf-boys and one wolf-girl. My attention was kindly drawn by a friend to the proceedings of 1875 of the Bengal Asiatic Society, before whom a paper was read on a similar subject by the geologist, Mr. V. Ball. This paper contains a short account of one of the two boys referred to, supplied to Mr. Ball by the Rev. Mr. Erhardt, the then Superintendent of the Secundra Orphanage. The account says of one of the boys that "he was brought to us on March 5th, 1872. He was found by Hindus who had gone hunting wolves in the neighbourhood of Mynpuri, had been burnt out of the den, and was brought here with the scars and wounds still on him. In his habits he was a perfect wild animal in every point of view. He drank like a dog, and liked a bone and raw meat better than any thing else. He would never remain with the other boys, but hide away in any dark corner. Clothes he never would wear, but tore them up into fine shreds. He was only a few months among us, as he got fever and gave up eating. We kept him for a time by artificial means, but eventually he died."

Mr. Erhardt says further on: "Neither of the above are new cases however. At the Lucknow mad-house there was an elderly fellow only four years ago, and may be there now, who had been dug out of a wolves' den by a European doctor, when I forget, but it must be a good number of years ago."

Ancient classical literature holds before us several cases of such miraculous escapes of children at the hands of ferocious animals and birds, like the wolf and the eagle. The case of Romulus and Remus is well known to many of us. Amulius, a king of Alba Longa, who had deprived his elder brother, Numitor, of his rightful claim to the throne, being fearful lest the heirs of Numitor might rise against him, caused his son to be murdered and his daughter Silvia to be made a Vestal virgin. Silvia, being violated by Mars, gave birth to two sons, Romulus and Remus, who, together with their mother, were ordered to be drowned in a stream of the Tiber, whence they were carried by a she-wolf, who had come there to satiate her thirst, and who, feeling an attachment for them, suckled and nourished them. Their discovery at the wolf-den by Faustulus, the king's shepherd, led to their ultimate return to their grandfather Numitor and to the foundation of Rome.

Tradition has attributed to Zoroaster a miraculous protection at the hand of she-wolves. When a child he was stolen from his house by some evil-minded persons, who predicted a great blow to their evil cause at the hand of the child when it came to age. They took the child to a den of wolves at a time when the ferocious beasts were absent from their home, killed their young ones, and placed the child there, with a view that the wolves on their return, finding their young ones thus killed, might wreck their vengeance upon the child. The wolves on their return seeing what had taken place at first grew furious, but soon after took the deserted child under their protection, until it was discovered and taken home by the mother, who was wandering in search of the child.

Old classical literature gives us other instances where young children were nourished and brought up, not by wolves, but by ferocious birds. Firdousi, the *great Homer* of the East, in his well-known Persian epic, the Shah-nameh, says of the father of Rustom, the *great national* hero of Iran, the Hercules of Persia, that he was brought up by a ferocious bird, called Sîmorg, which, according to the *great Persian* historian, Sir John Malcolm, is the same as the bird Rokh, and which according to some authors is the same as the Griffin, and according to others the same as the Phœnix. It was called Sîmorg (*i. e.*, 30 birds), because it was thought to be as strong singly as 30 other large birds combined. According to Firdousi, in the time of king Minocheher, the wife of Sâm, the Persian General, gave birth to a son, whose body was all covered with gray hairs like that of an old man. Just as William II. was surnamed Rufus, from the redness of his hair, just as Pyrrhus was so called from the yellowness of his curls, and just as the family of Julius Cæsar derived its surname of Cæsar from the fact of its founder having a thick curl of hair (*Lat.* caes-ar-ies, *Sans.* केस, kesa), so this child of Sâm was called Zal-i-zar, *i. e.*, golden-haired old man. The great Persian General Sâm disliked this ugly-looking child, and thought that it brought shame and disgrace upon the family, so he sent the child away to the Caucasus to be exposed on Mount Elburz. While there the bird Sîmorg came to prey upon it, but instead of devouring the child, had compassion on it, and took it to its own abode and nourished it with drops of blood from other young animals that it killed. The child was nourished by the bird till it grew up to be a boy, and was taken away by the father, who was always labouring under the stings of conscience for his cruelty towards the child.

Firdousi thus describes the interview between the child and the ferocious bird:—

"Chû Sîmorg râ bachê shud gursnê,
Beparvâz bar shud buland az bané
Bebordash damân tâ be Elbourz kûh
Ke bûdash dar ânjâ kanâm-i-garûh
Suyê bachegân bord tâ beshkarand
Bedân nâle-i-zâr-i-û benegarand
Bebakhshûd Yazdân-i-niki dehash
Yaki bûdani dâsht andar bavesh
Khodâvand meheri be simorg dâd
Nekard û bekhurdan as ân bache yâd
Negeh kard Sîmorg ba bachegan
Bar ân khûrd khun az dû dideh chegân
Shegaft în he bar-u fekand and meher
Bemândand khireh badân khûbcheher
Shekari ke nazuktarânbar guzid
Ke bîshîr mehmân hami khun mazîd,"

i. e., "When the young ones of the Sîmorg got hungry, the bird went flying from its nest into the air. It carried it (*i.e.*, the child) rapidly to the Elburz mountain, where there was the nest of its family. It carried it to its young ones, so that they may devour it, and see the excessive weeping of the child. God the bestower of goodness favoured the child, because there was a long life in store for it. God gave tenderness of heart to the Sîmorg and therefore it did not think of devouring the child. Sîmorg and its young ones looked to the child which was shedding tears from both its eyes. It was marvellous that they showed kindness to the child, and were struck with astonishment at the good-featured child. It (Sîmorg) selected for the child, delicate and young animals so that the host may taste their blood instead of milk."

Again, the Greek writers also speak of a Persian prince Achæmines being nourished by an eagle. So was Zanymedes, a beautiful boy of Phrygia, nourished by an eagle.

Semiramis, the founder of the Assyrian empire of Nineyah, was miraculously preserved and fed by doves. Her mother, Derceto, of Ascalon, in Syria, being ashamed of her frailty with a Syrian youth, exposed this infant child in an open place, where she was preserved and nourished by doves till she was discovered by some wandering shepherds, who took her to Simmas, the chief shepherd of the royal herds. It was from this Simmas that she derived her name of Semiramis. Her surpassing beauty first made her the wife of Onnes, one of the king's generals, and then that of the king himself.

MISCELLANEOUS NOTES.

SERICULTURE IN INDIA.

THE follwing interesting letter has been addressed by Mr. S. Cunliffe Lister of the Manningham Silk Mills, Bradford, and the Lister Grant, Dehra Dun, to Mr. Wardle, of Leek:—

Bradford, January 2nd, 1889.

I have read with great interest Mr. Mukerji's letter to you, published in the Report of the Silk Association. You are already aware that it was not my intention to have said or done anything with regard to my sericultural experiments in Dehra Dun and the Punjab, until the coming crop had been ascertained; but we have now got an official appointed by the Indian Government, and as time is of importance, I have thought it might be of use if I shortly and roughly sketched out what has already been done, and also what I think might be done to maintain and develope sericulture in India. It is evident that Mr. Mukerji has much to learn when he says "again it is an industry which must necessarily be in the hands of native peasant," &c., and further says, "and it is *impossible for foreign capitalist with hired native labour, to succeed in this industry*." Such then is the opinion of Mr. Mukerji to-day, and such may be said to be the universal opinion, that sericulture is impossible on any other lines than those which have been followed for thousands of years in all silk-producing countries, both in Europe and in Asia, and yet with all this weight of authority against me, backed up by the experience of ages, I am prepared to demonstrate, to show and prove, beyond all question and doubt, that labour, guided and controlled by capital and knowledge, can produce cheaper and better silk than has hitherto been done by cottage cultivation. Thus you have diametrically opposite opinions, and opposite systems, which time and experience can alone show which is right. I have tried both systems, and have paid dearly for my learning, and therefore can speak with some authority, and I am fully persuaded that this great problem is now completely mastered, and that the future of sericulture in India is thereby assured. Nothing, therefore, could give me greater pleasure than that Mr. Mukerji, or any other official, should go and see for himself what is being done at Lister's Grant, and examine and test everything relating to the cost and the quality of the silk produced. If his report is, as I believe it will be, satisfactory, then another year I should propose that the Silk Association should send some one along with a Government official and should again examine and test everything relating to the cost and quality of the silk produced, and so prepare the way for its being carried out on a much larger scale by British and native capital. The time for the silk crop is close at hand, and, from its commencement in the first or second week in February, only requires from 30 to 40 days to complete it, so that either Mr. M. or some other expert appointed by Government, might easily devote a month to testing the results.

A considerable portion of the mulberry plantations are now in fair bearing, and surround the rearing houses, and we are provided with seed of the first quality, being the produce of Italian and French breeds, reared on the estate, so that there should be and can be no difficulty in testing everything. For this I have patiently worked year after year, and at last the time has come. I have said, give me fulcrum, and I can move the sericultural world. Give me labour sufficiently trained ; seed free from disease ; plantations of sufficient age ; and rearing houses adapted for the purpose (and without this it is all labour in vain) ; and then there can be no difficulty in obtaining the most positive, accurate, and undeniable result.

There are certain things of great importance that we have already tested and proved. First, that disease, when the worms are properly fed and attended to, is unknown to us ; second, that the seed of the Italian and French *Bombyx mori* reared in the Dun, gives just as good cocoons as in Europe, and, so far, does not appear to degenerate. Last year we compared the two, and found that the cocoons raised from our own seed were quite as good as those from imported European seed. We have therefore ceased to import any, and rely altogether upon our own ; and last year, Mr. Farrant, the manger, to whom much of our success is due, in a small experimental way raised four crops of the ordinary polyvoltine Bengal sort without so much as losing a worm. Such have been the results of intelligent and careful cultivation, and I am perfectly satisfied that disease, about which we hear so much, is only another name for ignorance, neglect, dirt and rearing houses altogether unsuited for the purpose.

I am not proposing to write a treatise on sericulture (I must leave that to those who have more time at their disposal) ; but the whole art and mystery may be expressed and enforced in three or four simple rules. First, sound seed ; seconds air, space, and cleanliness ; third, regular feeding; fourth, suitable rearing houses. And where do you find these conditions in the native cottage ? I have never seen anything of the kind ; they may exist, but I again say, I have never seen them. Air, space and cleanliness the worms must have, or disease is certain. Then comes regular feeding, and at night, if possible, as we find that the worms are healthier, spin sooner, and make much finer cocoons, with night feeding.

Mr. Bose, Secretary of the Gurdaspur Board, is right, when he says (and he has evidently taken infinite pains) : "My own impression is that the prevalence of disease was far more owing to the want of care, the negligence and generel ignorance which prevail amongst rearers than anything else." At last, the Government officials are beginning to find out what I have long since discovered, that it is impossible to rear silk-worms in dirt accompanied with neglect. And he says :— " They never care to make the rearing houses airy, and to keep them clean." Under such conditions it is clear sericulture is utterly impossible. Give what prizes you will, it is all money thrown away. Mr. Dane, Deputy Commissioner, Gurdaspur, says—"The first prize for foreign seed cocoons fell to Lister & Co.," and further on he says—"it seems somewhat absurd" (I should think it does) "to award over 1,000 rupees' worth of prizes for a total out-turn of silk of such trifling value, *viz*, Rs. 6,415." And what is more if they gave every shilling in the Indian Treasury they would not be one bit nearer. All the wealth of India can never make silk-worms thrive in the hands of dirty, careless, ignorant native rearers. I have paid for my learning, as for several years I joined the Government in giving prizes; but I soon saw that it was a perfect waste of time and money. Then it was that I determined to try what could be done by having everything carried out in a proper, business-like manner; and I am now, as I think, on the point of having a great success, after years of trouble and expense.

Just a word with regard to cottage cultivation, and then I have done. Where mulberry trees abound and the climate is suitables, cottage cultivation should be possible, provided the native rearers are supplied with sound seed, and, above all, are taught how to use it. A certain number of intelligent, trained rearers, going from house to house, might soon bring about abundant success; but it is quite useless to offer prizes to men who know nothing of sericulture, and who are totally ignorant of the fundamental fact that silk-worms cannot be reared excepting with sufficient air, space, cleanliness and regular feeding.

A BLACK TIGER.

No authentic record exists of a black tiger having been seen or killed in Bengal so I am informed. Black leopards are well known, especially in the Madras Presidency and in the Straits Settlements, and I have heard of them in Bengal, though I never saw them alive there (except in the Calcutta Zoological Gardens). But before I go hence and am no more seen, I wish to state that I and several others saw a dead black tiger at Chittagong, and from the entries in my diary, which was pretty regularly kept, I know that it was in March 1846. The news was brought into the station that a dead black tiger was lying near the road that leads to Tipperah, distant about two miles from Chittagong. In the early morning we rode out to see it, but several of the party—Sir H. Ricketts, Mr. Fulwar Skipwith, Captain Swatman and Captain Hore—are no longer alive, and I cannot produce any eye-witness to attest my statement, although several friends to whom I have written recollect that they heard something about it at the time.

I remember perfectly well that the body of the animal was lying in the low bush jungle about twenty yards south of the road, and we dismounted to go and look at it. It was a full-sized tiger, and the skin was black or very dark brown, so that the stripes showed rather a darker black in the sunlight, just as the spots are visible on the skin of a black leopard. The tiger had been killed by a poisoned arrow, and had wandered away more than a mile from the place where it was wounded before it lay down to die. By the time that we arrived the carcase was swollen, the flies were buzzing about it, and decomposition had set in, so that those of our party who knew best decided that the skin could not be saved. I was young and inexperienced, but Captain Swatman, who was in charge of the Government elephant kheddas, and Captain Hore (afterwards Lord Ruthven), of the 25th N. I., were well-known sportsmen and had each of them killed many tigers. No doubt was expressed about the animal being a black tiger, and I have often mentioned the fact in conversation from time to time. For several weeks before we saw the dead body, the natives had reported that there was a black tiger which infested the range of hills behind the military cantonments at Chittagong. More than once, when the heardsman brought word that it had killed a cow, Captain Swatman sent an elephant and howdah for me, and we beat through the jungle in vain for it. Probably our tactics were bad as we invariably went right up to the body of the murdered cow, and the tiger sneaked off on hearing the noise of the elephants into the extensive and impenetrable coverts. We did not attach any importance to the native statement that the tiger was black, as we supposed that this was merely an exaggeration. So also, when a report came in through the native police that a man had been killed by a black tiger in a large village about three miles to the south of the hills behind the cantonments we supposed that the epithet "black" was only a fanciful description of the animal. When, however, we had seen the black skin of the dead tiger, we concluded that the native authorities had not been drawing on their imagination when they used the epithet "black."

I cannot venture to offer any explanation why this tiger's skin was black. It is well known that there is considerable difference of colour in the skins of ordinary tigers. Some skins have almost a light yellow ground, whilst in others the colour approaches to a dark chestnut-red. Some people attribute this variety of colour to the character of the jungle in which the animals have lived, and this has a sort of probability in it; but the age of the tiger may have also something to say to it, and a beast which was of a dark red in its prime may turn to a lighter colour when it grows old. It was my good fortune during the last forty years to see many more tigers, both wild and in captivity, than falls to the lot of most men in Bengal. I can testify that on the churs of the Ganges and Brahmapootra, when shooting during the hot winds in the end of March, through the remains of the burnt grass and charred stalks, that the animals seemed to vanish before our eyes. Many authorities have written that the skin of a man-eating tiger is usually mangy and dull in colour. There were two man-eating tigers caught and sent to the Calcutta Zoo, whose skins were in perfect condition and of a rich colour. There was a fine tigress about five years old with a clean and well-marked skin, whose career I had to cut short, as she had taken to preying on the villagers of a place near Dacca; so that these cases were exceptions to a general rule. But I have no doubt that it is quite true that many old and mangy tigers, with decaying teeth and claws, become man-eaters. The reason is simple. A human being is the most facile prey for a tiger. One grip on the slight neck of a woman and all is over. There is no striking with pointed horns or kicking with sharp hoofs, as the tiger finds when he is killing a deer or a cow. And who shall say whether a healthy young woman is more tender and wholesome food than the flesh of a sickly old cow, half-starved in the jungle?—C. T. BUCKLAND, F.Z.S., in *The Field*.

NOTE ON A TALKING BULBUL.

It is well known that the common, or Madras Bulbul, as is called (*Pycnonotus haemorrhous*), makes a very amusing pet, and is held in high estimation by some of the natives of the country, especially the Mussulmans, for its pugnacious qualities great care being bestowed on its training for combative purposes, but it is not as generally known, I doubt if known at all, that its imitative intelligence is on a par with that of the parrot and other "talking" birds. I was not aware myself that these birds could talk, till some years ago I found it out by something of an accident, and having been the possessor of the bird in question, I can speak from personal experience. Some years back, when in one of the northern districts, of the Madras Presidency, a Mahomedan assured me that the Bulbul could talk, and informed me that he had had several which could utter various Hindustani phrases, but as I had reared a number of them, and in no instance knew of any that went beyond their whistle, I could not believe him. Anyhow, as he seemed quite confident of what he told me, I determined to give his statement a fair trial, and he having brought me a young bird a short time afterwards, I straightway put it to school. I could not, however, have been very industrious with my bird pupil, for it never picked up a single sentence of my teaching, but what I failed in, a parrot accomplished. Both these birds occupied the same quarters, and whether it was knocked into its "hard-bound brains" by the parrot's continual chattering or not, I cannot say, but it gradually began with "Polly, Polly, Polly, Polly," and eventually could say, "Pretty Polly, pretty dear; twenty guineas for pretty Polly," and other such hackneyed expressions of bird-lore, with head bent down, tongue protruding, and wings expanded, antics for which these birds are famous. It would utter sentence after sentence which, though not very distinct, were quite as intelligible as the talk of a parrot and other birds. Like most pets, my poor bird came to an untimely end through the carelessness of the servant, who left the cage door open one night, so that the next morning I found it destroyed by that pest, I had almost said of creation—the rat.

Yercaud, April 1889. A. W. MORRIS, F. Z. S.

THE RED ANT.

By E. H. A.

THE ways of this remarkable insect are not so well known as they deserve to be. Most of us have made its acquaintance at times in the jungles, but these casual introductions have left no desire for closer intimacy. I think, therefore, that a short account of the Red Ant at home, unillustrated by live specimens, may be interesting.

The insect I mean is about half an inch long, and of a light red, or orange-brown, tint. Its scientific name is *Camponotus smaragdinus*, or "the emerald ant," and Kirby says it is remarkable for its green colour. The explanation of this is probably that the first specimen which found its way to Europe was a queen, for she is green and is a handsome and striking insect We are more concerned with the worker, and may stick to our familiar name. The red ant, then, is not a house ant. It does not enter our dwellings and plunder our stores. Neither is it a ground ant. It makes neither burrows nor hills. It is entirely arboreal, making its nest among green leaves, which it draws together with a material like silk, or cobweb. As to its food, it seems, like most ill-tempered people, to need very little. I have never seen the red ant storing any thing, but they swarm about corrinda bushes during the fruit season, and often enclose the berries in their leaf cells. They do the same with other fruits, and I have seen them in attendance on aphides. But it would be rash to infer from this that they subsist on nectar and sweets. A friend of mine, and a valued member of this Society, had a tame eagle killed by them and that it was killed for the table admits of little doubt. I believe they devour young birds and every other living thing that falls in their way and cannot escape Considering how few trees on the western ghauts are free from them, it seems a wonder that birds can find places to build their nests. From what I have seen I am inclined to think that a good many nests are deserted on account of them. The red ant appears to be as active by night as by day This is a point in which the various species of ants differ very much from each other. Some never come out of their holes at night, while some regularly retire for a siesta at noon and doubtless some are wholly nocturnal.

But that which distinguishes the red ant from all other ants, and indeed from all other beings, is its temper. The shepherd in NOCTES AMBROSIANÆ says that the wasp is the only one of God's creature which is eternally out of temper; but the shepherd did not know the red ant. Nor did I till lately. I thought I did, and by painful experience too. I had often had reason to notice how they appear to have intimation beforehand of your intention to pass that way. How they run down every branch that stretches across the path, and wait with jaws extended, how they fling themselves on you, or drop from above, and scorning to waste their strength on your hat or clothes, find out the back of your neck, and bury their long sickle shaped mandibles in your flesh; but I lately discovered that all this was only the A B C of their ferocity. One evening I found that a countless multitude of red ant had collected about two trees close to my tent and were making a thoroughfare of one of the ropes. I thought it best to discourage this, so I got some kerosine oil the best antidote I know for insect pests of every kind, and dipping a feather into it, began to anoint the rope, thinking in my simplicity that they would not like to cross the oil and would be obliged to find another road. There was a perfect storm of indignation. They rushed together from both sides, and threw themselves on the oiled feather in the spirit of Marcus Curtius. They died of course, but others came on in scores, panting for the same glorious death, and I had to give up my idea of dislodging them by kerosine. I determined then to try tobacco, for I had always supposed that man was the only animal which could endure the smell of that weed. I lighted a cheroot, and steadily blew the smoke where they were thickest. Never in my life have I seen anything like the frenzy of passion which followed the first few puffs. To be attacked by an enemy of which they could not lay hold seems to be really too much for them. In their rage they laid hold of each other, and as a red ant *never* lets go, they were soon linked together by head, legs, and antennæ into one horrible, red, quivering mass I left these, and going to another place, offered the end of my cheroot, with about an inch of ash on it. Several seized it instantly The heat killed them, but others laid hold of their charred limbs, and by their united strength they positively wrenched off the ash which remained hanging from the tent rope, by their jaws, while scores hurried from both sides, with fiendish fury, to help in worrying it. I then presented the hot end. The foremost ant offered battle without a moment's hesitation, and perished with a *fizz*, but another and another followed and I saw plainly that I was beaten again, for the cheroot was going out, while their fury only burned the more fiercely. I retired, and after taking counsel with the captain of my guard, made a torch of straw and patiently smoked them to death all along the rope. Then I attacked the root of the tree where they were thickest, and left nothing but a black waste. Half an hour later fresh myriads were carrying off the charred remains of their comrades. They took them up the tree towards their nest, whether for food or burial rites I cannot say. It was now getting dark, so I gave up my enterprise; but before going to bed I brought out a lantern and found them calmly passing up and down my tent ropes as before. I had done everything I could short of burning down my tent, and they remained masters of the field.

It may interest members of the Anthropological Society to know that the jungle people in the Canara District eat the red ant. They take down the whole nest, and pounding ants and larvæ together, make them into curry. The blood, or juice, of the red ant is, as might be expected, intensely acrid, and it is said that the fumes which rise from them as they are being pounded make the eyes of the operator smart, so what the sensation of eating them must be is scarcely thinkable. It must be like a torchlight procession going down one's throat.

MEMORANDA.

By H. Littledale, Baroda.

Malformed Sambur Horn.—I am sending for exhibition at the next meeting of the Society a sambur-horn—or perhaps a pair of horns joined together—that I have picked up in the jungles east of Surat. These horns seem to have dropped naturally from the head. They are the strangest looking pair I have ever seen, and seen different from any yet figured in the Journal.

The Arni or Arna (*Wild Buffalo*).—The Arna or Wild Buffalo and the Gaur, or Indian Bison, do not inhabit the same jungles as a rule, and to the minds of the natives there can be no difference worth considering between them. Hence I ask is the name Arna or Arni the same word as Rani, the Bheel name for the bison being Rana paro or Rani Bhains, that is, Forest Buffalo? For *Rani* of Matheran. Then Arni Bhainsa and Rani Bhains would be the same name applied to different animals (*Bos arni and Bos gavaeus*). Such instances of confusion are common in Indian nomenclature.

The metathesis *ar* and *ra* is common too. One instance occurs to me: in Kashmir the natives call a tree *darkhat*, whereas the correct form is *darakht* I believe. The derivation of *Arná* from the Skt. *Arrayak* seems less probable than this conjecture.

The Great Indian Flying Squirrel.—I find that this animal is nocturnal in its flights. Last full moon, I was sitting up in the jungle, and one of these squirrels glided from tree to tree near me. It mounted with curious loopings of its body (as some caterpillars climb) from the very foot to the highest spray of a *Kadai* tree, then launched itself in a curving glide towards the next tree, rising a little when about three yards from it, and taking the trunk about three feet from the ground: the length of flight from 60 to 80 feet, I should say.

Bear killed by Tiger.—I was after a bear for some days in May, but it was missing from its accustomed haunts. At last we found it, or rather its claws, and a few bones, in a tiger's cave. It was a big bear, with claws quite 3 inches outside curve, but the tiger had certainly shikarred it, and eaten every bit of it!

The Wild Dog and the Tiger.—I found that the old story of wild dogs killing tigers existed in the following form in the Surat jungles. We were talking of a pack of eleven wild dogs that had been killing a sambur close by, and I said to my shikarri, "Shoot them if you can." "No," said the Vasava Patel of the village, "these dogs are my gods: they kill tigers for me." I asked him further, and he said that the dogs—a large pack of them—tree a tiger, then two dogs mount guard, and the rest go away hunting; then two more come and relieve guard, and so on, till the tiger dies of hunger in the tree. (It is in Rice's *Indian Game from Quail to Tiger* that a similar account is given, and a still more wonderful yarn of the tiger dying in the tree, afraid to come down because one wild dog had got spiked on a piece of wood below, and months afterwards the two skeletons were found—the tiger's in the tree, and the dog's sticking on the spike at the foot on the tree!)

Carbolized Arsenical Soap.—Instead of putting camphor in arsenical soap, let me recommend that one ounce of pure carbolic acid be added to every pound of the mixture. This carbolised stuff if applied fresh to the lips, &c., of a skin, will prevent all decomposition. This is much better than the old arsenical soap, and I beg to present the suggestion to all shikarries.

PARASITIC TREES.

On the south side of Chakdara, an outlying Dang village, some 20 to 30 miles east of Bardoli, in the Surat District, is to be found a rather curious case of parasitism.

The parasite is a Sterculia urens (*Karaia kangdoli*), and the victim is a Schleicheria trijuga (*Kosim*). The Kosim is a large bifurcated tree, old and hollow. A branch on one of these forks was cut off. On the stump of the branch a young Karaia established itself, and at the present time has attained about the size of the original branch, with the appearance of being a regular graft. It flowers profusely, and did so when first found three seasons ago. Its present thickness is considerably greater than the head of the thickest headed man, with his pagri on. The pagri itself is about the diameter of the parasite, which is seated at a height of twelve feet or more.

The Ficus family of course are, without exception, so far as I know them, the lowest of greedy parasites, but though the Sterculia has a suspicious viscid and plastic appearance in its manner of flowing over inconvenient stones, in its throwing out of large knobs, and in covering up wounds, yet it is not often found parasite at least in the Dangs, and the present instance is perhaps worth recording. It would be interesting to know where the roots are now, how the Sterculia will manage, as its trunk grows inconveniently large; and whether it gets blown down along with the Kosim, or succeeds in establishing itself in the ground down the interior of its supporter. The tree is just on the west side of the road, at the point where it begins to descend from the plateau to the river bed.

F. G.

Madras, Ruudall's Road, 17*th April* 1889.

A CORRECTION.

To the Editor of the Journal of the Bombay Natural History Society.

DEAR SIR,—In your Journal No. I., Vol. III., for 1888, you kindly inserted a list of Burmese Butterflies caught by me. As it was not practicable to submit the proof to me, I regret to say that a good many errors crept in, and I should feel much obliged if you could find room to insert the following corrections and additions:—

No. 3. D. aglæa, Cramer, this should be D. melanoides, Moore.
No. 16. E. midamus, Linnæus, should be E. linnæi, Moore.
No. 19. E. subdita, Moore, should be E. binghami, Moore.
No. 42(*a*) M. duryodana, Felder, Beeling.
No. 97. Curetis bulis, Doubleday.
No. 100. Allotinus alkamah, Distant.
No. 101. A. unicolor, should be Paragerydus horsfieldi, Moore.
No. 109. Tarucus plinius, Fabricius.
No. 121 }
No. 122 } Varieties of N. ardates.
No. 123. N. prominens, Moore.
No. 124. N. macrophthalma, Felder.
No. 126. Catochrysops cnejus Fabricius.
No. 133. Megisba malaya Horsfield.
No. 134. Lycænesthes bengalensis, Moore.
No. 137. Drupadia boisduvam, Moore.
No. 141. Spindasis syama, Horsfield.
No. 151. Nilasera subfasciata, Moore.
No. 157. Rapala sphinx, Fabricius.
No. 168(*a*). Catopsilia gnoma, Fabricius, Beeling.
No. 172. Terias rubella, Wallace.
No. 175. Terias Hecabeoides, Ménétriés.
No. 186. Pierids soracta. I cannot account for this name occurring in the list; it has never been met with in Burmah to my knowledge.
No. 200. P. onpape, Moore.
No. 252. Suastus swerga, de Nicéville.

Hoping the above will not be found too trivial for insertion,

Yours faithfully,

Madras, 17th April 1889. E. Y. WATSON.

PROPOSED ENGLISH NOMENCLATURE FOR INDIAN BUTTERFLIES.

The following letter appeared in the *Asian* on 11th June 1889:—

Sir,—You publish in your issue of May 28th a note on a paper read before the Bombay Natural History Society by Mr. A. Newnham, B. C. S., on the abovenamed subject. With due deference to that gentleman, I think he has somewhat underrated the difficulties arising from such a proposal, and has rather exaggerated the benefits that would accrue from its adoption.

But he is wrong, however, in disparaging the use of the "long double-barrelled Latin" names which at present distinguish our Indian butterflies.

From a scientific point of view, such a nomenclature, though, no doubt, somewhat "heavy," is a necessity as much in the study of butterflies as in any other branch of Natural History.

At home, where we have only some sixty odd specimens to deal with, it has been easy enough to affix appropriate popular names to the several species, but I would remind Mr. Newnham that the "double-barrelled Latin" names are in no way extinct, and were the original ones. They are, of course, the only ones used by naturalists when discussing the subject. In my opinion it would be a much harder tax on the memory to be able to recall some hundred popular nicknames, than to remember the specimens by their generic and specific names, for the use of the generic name supplies a cue to the specific name.

Mr. Newnham has apparently a prejudice against these long-sounding Latin strains, and has passed them by rather too casually, for he has failed to observe any indications of appearance or habits in them. I select a few out of the many to support my argument.

P. leucocera, *Castalius interruptus*, *Telicota bumbusæ*, *E. undularis*, *Abisara suffusa*, *Zizera pigmea*, *Junonia asterie*—*all* denote either appearance or habits. There are hundreds of others named on the same principle. Many have been named from the locality in which they appear to frequent, some from the original discoverer, and *others* have been named "poetically and beautifully," and it is precisely these latter which are of little use to the investigator and collector.

Provided poetry and beauty are combined in a name, with some indication of the habits or appearance of the insects, it is all right; but mere nicknames, such as the "Leaf" butterfly or the "Camberwell Beauty," are useless and undesirable. With regard to the former nicknames, I shall have something to add later on.

One specimen, *Badamia exclamationis*, appears to have been so called from the many ineffectual attempts (accompanied by strong language) to capture it!

Our Indian butterflies possess, no doubt, as many peculiarities as their English relations, but these peculiarities have yet to be noticed and recorded in the majority of cases before any suitable and expressive names can be permanently chosen. Some of the more well-known species have received popular names, either from amateur collectors (? I refer to those who purchase boxes of butterflies to send home or decorate rooms with), or from the soldiers and school-boys up-country, such as the Rose butterfly, the Leaf, &c., &c. This latter, I believe, is really *Kallima inachis*, but there are several others to be found in India "exactly alike" (except to the eye of an expert), "only a little different," as Pat would say. Does Mr. Newnham propose that all such butterflies should be called "Leaf" butterflies? For, if not, a man would still require to be a naturalist to be able to distinguish them, and, if so, then we should get very puzzled in identifying the exact insect caught unless we saw it, whereas if he uses the scientific name there is at once an end to all doubt as to its identity. I do not see (and should like to see the matter thoroughly investigated) how such an introduction would in any way further the work of naturalists in this country; and it is to them we must look to complete in time a branch of Natural History which receives a very scant attention or interest at the hands of the general public. The latter would, I have no doubt, learn the names of a few more specimens by the introduction of a popular English nomenclature, but whether they would take any further practical interest in the subject is extremely doubtful. If I have missed any points which Mr. Newnham suggested I hope he will enlighten me further on the subject, which is one of great interest to all who wish to see the "Indian butterflies" occupying the place which they deserve from their beauty and variety.

W. H. T.

CORRESPONDENCE.

PAPILIO POLYMNESTOR IN BOMBAY.

To the Editor of the Journal of the Natural History Society.

Sir,—At page 37 of Vol. II. of the Journal, Mr. Aitken says the *Papilio polymnestor* is absolutely unknown in Bombay, and he imagines throughout the Konkan. It may be interesting to him and others to know that one day this month, a friend and I saw two in the woods of Sivâdî, and within an hour, possibly the same pair in the cemetery. They were a little ragged, but strong in flight, and were feeding on the flowers of a large convolvulus.

In a small spot near the quarry we came upon fifty or sixty of the *Danai genutia* resting on the grass and trees, and a sweep of the net at a passing *Ixias* landed one and two of the former.

W. F. MELVIN.

Bombay, 4th March, 1889.

BOOK NOTICES.

The Geographical Distribution of the Family Charadridæ, or the Plovers, Sandpipers, Snipes and their Allies. By Henry Seebohm. Published by H. Tottenham and Co., Strand.

The name of H. Seebohm is well known as a practical ornithologist of the first rank. A perusal of his work, "Siberia in Europe," and "Siberia in Asia," will show that no one man can push practical work further than he has done, and every ornithologist should read the two works referred to above. Apart from their zoological value they are most interesting reading ; but to proceed :

In the Preface he explains difficulties which had to be overcome in the determination of species, and the definition and limitation of genera.

The concluding words of the Preface are (referring to the book):—"It possesses at least the merit of originality and (if the author may be permitted to pass sentence on his own work) it does not quite deserve the critical remarks made once to a writer, 'Your book is both good and new, but the part which is good is not new and that which is new is not good.'"

After the Preface comes a systematic index and diagnoses in Latin, followed by a list of plates, of which there are 21, the plates being limited to those birds which have previously not been figured, or only figured badly.

The first nine chapters are taken up respectively with dissertations on the Classification of Birds, the Evolution of Birds, the Differentiation of Species, the Glacial Epoch, Migration, the Paradise of the Charadridæ, Zoological Regions, on Subspecific Forms, and the Charadridæ.

Chapter X. commences the body of the work.

The contemplation of Nature is supposed to exercise a soothing influence, they say, on the mind of man, but when the contemplators write books, it is nearly always the case that they are no more sparing of their criticisms of those who happen to differ from them, than are politicians, and Mr. Seebohm is no exception to the rule.

Commencing with the Stone Curlews, the Stone Curlew we meet in India as a resident is separated from the European bird by the trinomial *Œdicnemus crepitans indicus*, but there does not appear to be very much difference between the two. He says the Indian Stone Curlew and the European one are connected by a series of intermediate forms. The latter vary in length of wing from 10″ to 9″, the former from 9″ to 8″. In European examples the white patches on the primaries are rarely seen on the bird, whilst in Indian examples they are rarely if ever absent from it. The white on the outer web of the seventh primary is also much greater in Indian than in European examples. *Œdicnemus crepitans* doubtless winters in India.

Charadrius pluvialis (the European Golden Plover) is not mentioned as an Indian visitor, but the Siberian birds appear to pass through Turkestan on migration, a few remaining to winter in Baluchistan, but the greater number probably migrate as far as Africa. The Asiatic bird, *C. fulvus*, may easily be distinguished by its barred tail and great axillaries.

We have the *C. minor* (the Little Ringed Plover) and *C. minor Jerdon* (Jerdon's Ringed Plover); it is said to differ from the former in being smaller (wings 3·9 to 4·25 instead of 4·3 to 4·7 in.), in having the edges of the eyelids swollen and protuberant, and in having the basal half of the lower mandible yellow.

Lobivanellus indicus—The Bronze-winged Wattled Lapwing and *L. indicus atronuchalis*, Blyth's Wattled Lapwing, is hard to separate; intermediate forms are frequently met with; the latter may be distinguished from the former by having the *neck ornamented with a white collar.*

The Common Curlew and the Indian form are separated under the names of *Numenius arquatus* and *N. arquatus lineatus.*

N. arquatus.	*N. lineatus.*
Lesser back white, streaked with brown.	Lesser back unspotted white.
Axillaries white, more or less spotted with brown.	Axillaries unspotted white.
Margins of scapulars and feathers on the upper back grey.	Margins of scapulars and feathers on the upper back nearly white.
Length of bill 4·5 to 7 inch.	Length of bill 5·5 to 8 inch.

None of these characters appear to be constant, and intermediate forms are very common.

In a note there is:—"This is no excuse for confounding the two forms together, as Dresser and other ornithologists have done."

Similarly with the Whimbrels, *Numenius phœopas* and *N. phœopus variegatus.*

The Common Whimbrel is not a Curlew, because its crown *is plain brown with a pale mesial streak* In its eastern form the Oriental Whimbrel is the only Whimbrel in which the *lower back is much paler than the mantle.*

The following is a list of the species mentioned as having occurred in India Proper:—

Œdicnemus crepitans	European Stone Curlew.
,, *recurvirostris*	Great Indian Stone Curlew.
Charadius fulvus	Asiatic Golden Plover.
,, *helveticus*	Grey Plover.
,, *minor*	Little Ringed Plover.
,, *Jerdoni*	Jerdon's Ringed Plover.
,, *placidus*	Hodgson's Ringed Plover.
,, *Geoffroyi*	Greater Sand Plover.
,, *mongolicus*	Mongolian Sand Plover.
,, *cantianus*	Kentish Plover.
Lobivanellus cinerius	Grey-headed Wattled Lapwing.
,, *indicus*	Bronze-Winged Wattled Lapwing.
,, *indicus atrionucharlis*	Blyth's Wattled Lapwing.
,, *malabaricus*	Buffon's Wattled Lapwing.
Vanellus cristatus	Common Lapwing
,, *leucurus*	White-tailed Lapwing.
,, *ventralis*	Indian Spur-wingled Lapwing.
Cursorius gallicus	Cream-colored Courser.
,, *coromandalicus*	Indian Courser.
,, *bitorquatus*	Jerdon's Courser.
Glareola pratincola	Common Pratincole.
,, *orientalis*	Oriental Practincole.
,, *lactea*	Little Indian Pratincole.
Himantopus melanopterus	Common Stint.
,, *avocetta*	Common Avocet.
Hæmatopus ostralegus	European Oyster Catcher.
Ibidorhynchus strutesi	Ibis-billed Oyster Catcher.
Numenius arquatus lineatus	Oriental Curlew.
,, *phœopus variegatus*	Orental Whimbrel.

Amongst the Stints, there is *Tringa subminuta* (Middendorff's Stint); its specific characters are *wing from carpal joint less than four inches ; legs and toes pale brown ; outer tail feathers grey.*

Also *Tringa pygmæa* (the Spoon-billed sandpiper) which is recognized at once by its *spatulate bill.* The Snipes conclude the volume.

Scolopax solitaria (the Himalayan Solitary Snipe) is our Indian form. It has more than 16 tail feathers, whereas *Scolapax major* (the Great Snipe) *has less than 16 tail feathers,* also the *predominant colour of the four outer tail feathers, on each side is pure white,* and *the median coverts are broadly tipped with pure white*; the latter does not approach nearer India than North Persia, which it passes through in migration.

E. F. B.

Recent Information about the Great Auk or Garefowl. By SYMINGTON GRIEVE. Blackwood and Sons, Edinburgh.

THIS is a reprint of the Presidential address of the Edinburgh Field Naturalists and Microscopical Society for 1888. It is a brief sketch of the history of the Great Auk and its extermination, with a detailed account of where its remains, such as stuffed specimen, eggs, bones, skeleton, &c., are to be found.

The chief home of this bird used to be Newfoundland and the North American coasts; we need not be surprised at its extermination, as it was a very stupid bird, hatched only a single egg each season, and was good for food. They are described as having been got on boardship by the ton; they were then salted down in barrels like herrings.

The capture of what are believed to have been the last two Great Auks took place on the coast of Iceland, June 1884; its last authentic occurrence in Great Britain was in 1821, when one was captured at St. Kilda.

Various reported occurrences of a later date are then discussed, but there is no sufficient proof for any later record.

We then come to the record of the whereabouts of the Great Auk remains.

The following is a summary of existing remains:—

	Total No. of Birds represented.
Skins	78 or 79
Skeletons, more or less complete	21 or 24
Detached bones	841 or 851
Physiological preparations	2 or 3
Eggs	67 or 69

Of these remains, perhaps the eggs are the most interesting; some attention has lately been drawn to them by two having not long ago been sold by auction in London, and having realized enormous prices; one of these was sold in December 1887, and was bought by Mr. Field for £168: another was bought in 1851 for £1, from Williams of London by Mr. H. Holland; Mr. Holland's daughter, Mrs. Wise, into whose possession it passed, sold it in March 1888 by auction, when it was bought by Gardiner, dealer in Natural History wares, for £225.

In England, Lord Lilford has a collection of five eggs, and Mr. Champley of Scarborough has nine.

To show how the prices of these eggs have risen, I will give the prices at which some have changed hands:— 1859, £18; 1861, Napoleons 5; 1864 £24, £25, £30, £45; 1882, £110.

The pamphlet is illustrated by two woodcuts of the Great Auk, and its price is half-a-crown.

E. F. B.

PROCEEDINGS.

PROCEEDINGS OF THE MEETING OF 7TH MAY 1889.

The usual monthly meeting of the members of this Society took place on Tuesday, the 7th May 1889, and was largely attended. Dr. G. Maconachie presided.

The following new members were then elected :— H. H. Aga Khan, Mr. E Y. Watson (Madras), Mr. H. S. Ferguson (Travancore), Mr. R. Gompertz (Madras), Mr. S. J. Stone (Punjab), Lieutenant W. J. Bythell, R. E. (Beluchistan), and Captain A. R. Cole-Hamilton (Secunderabad)

Mr. H. M. Phipson, the Honorary Secretary, then acknowledged the following contributions to the Society's collections :—

CONTRIBUTIONS DURING MARCH AND APRIL.

Contribution.	Description.	Contributor.
295 Bird Skins	From Assam	Mr. J. Mouteath, C. S.
1 Snake	Echis carinata	Capt. Aves.
1 Snake	Cylindrophis maculatus	Mr. G. W. Vidal, C. S.
1 Lizard (from Ceylon)	Calotes nigrilabris	Do.
1 Snake	Tropidonotus plumbicolor	Mr. R. Wroughton.
2 Oil paintings of Orchids.	By Miss Hall, Poona	Lieut. E Jervoise, R. N.
1 Tufted Pochard (alive)	Fuligula cristata	Mr. F. Otto.
2 Tortoise Eggs	Testudo elegans	Mr. W S. Price.
16 Bird Skins	From Quetta	Mr. A. Newnham.
Several Grey Jungle Fowls	Gallus sonnerati	Col. W. Scott.
Head of Four-horned Antelope.	Tetraceros quadricornis	Mr. J. C. Anderson.
1 Red Lynx's Skin	Felis caracal	Mr. A. Spitteler.
1 Jungle Cat's Skin	Felis chaus	Do.
1 Engraving of Prof. Pasteur.	... ...	Mr. H. C. Parmenides.
1 Sea Gull (alive)	Larus ridibundus	Mr. W. F. Sinclair, C. S.
1 Wild Dog	Canis rutilans	Brig.-Genl. LaTouche.
2 Scaly Ant-Eaters	Manis pentadactylus	Born in the Society's Rooms.
1 Muntjac's Skull	Cervulus aureus	Genl. Pottinger.
1 Monkey (alive)	Macacus radiatus	Mrs Charrington.
1 Scaly Ant-Eater (alive)	Manis pentadactylus	Mr. W. Holland.
A quantity of Shells and Curiosities.	From the Persian Gulf	Mr. E. Leggett.
1 Muntjac's Head	Cervulus aureus	Mr. Ameerudin Tyabji.
1 Large Tiger-Cat's Skin.	Felis viverrina	Mr. H. S. Wise,
1 Monkey's Skull	Macacus silenus	Do.
2 Scaly Ant-Eaters (alive).	Manis pentadactylus	Mr. S. K. Betham.
1 Cat's Skeleton	Articulated	Mr. John Parmenides.
1 Fowl's Skeleton	Do.	Do.
4 Ibex Heads	Capra sibirica	Col. H. E. Ryves.
2 Markhor Heads	Capra megaceros	
2 Barra Singha Heads	Cervus cashmirianus	
1 Orial Head	Ovis cycloceros	
1 Thar Head	Capra jemlaicus	
1 Large piece of Flexible Sandstone.	From Rewara	Mr. J. W. Blackwell.
5 Stuffed Birds	From Shanghai	Mr. A. J. M. Inverarity.
2 Snakes		
A number of Snakes	From Godhra	Mr. C. F. G. Lester.
1 Brown Hawk Owl (mounted).	Ninox scutellatus	Rev. D. R I. Brandon.
1 Indian Screech Owl (alive).	Strix javanica	Mr. H. K. Cronan.

Contribution.	Description.	Contributor.
Skull of Indian Antelope.	Female, with horns	Major J. H. Yule.
A number of Fish and Reptiles.	From Raipur, C. P.	Mr. J. A. Betham.
81 Birds's Skins	From Saugor, C. P.	Lieut. H. E. Barnes.
1 Monitor	Varanus dracæna	Mr. G. Rayment, A. V. D.
1 Civet Cat	Viverra malaccensis ...	Mr. Framji Nanabhai Davur.
2 Panther Cubs (alive) ...	Felis pardus	Mr. E. H. Millard.
15 Pairs of Horns	Indian and African Antelopes	Brig.-Genl. La Touche.
Several pairs of Horns ...	African Antelopes	Capt. H. G. E. Swayne, R. E.
5 Bird Skins	From Poona	Mr. A. Newnham.
1 Malabar Red Squirrel (alive)	Sciurus malabaricus... ...	Mr. P. J. FitzGibbon.
A quantity of Shells, &c...	From Malabar Coast ...	Mr. Jas. Murray.
1 Jungle Cock's Skin ...	Gallus sonnerati	Mr. A. F. Pinhey.
1 Crocodile (ave)	Crocodilus palustris ...	Mr. C. M. Sykes.
A quantity of Reptiles, &c.	From Ahmedabad	Dr. Robb.
1 Picture in Oils	... ...	Mr. S. Tytler.
1 Indian Screech Owl 1 (alive).	Strix javanica	Mrs. A. Medcalf.

MINOR CONTRIBUTIONS FROM

Mr. John Griffiths, Mr. Justice Parsons, Mr. F. Otto, Mr. D. Bennett, Mr. Eduljee Davur, Captain Butler, Captain E. Masters, and Mr. Hewett.

CONTRIBUTONS TO THE LIBRARY.

"Wilson American Ornithology," 3 Vols., and "Life of Frank Buckland," from Mr. A. Newnham.

EXHIBITS.

The attention of the members was drawn to the following exhibits :—

1 wild dog's head and 1 large tiger-cat's head, mounted by Mr. Stanley Tytler.

A collection of shells from Perim Island, by Dr. Banks.

A photograph of the Talipot Palm (*Corypha umbraculifera*), now in flower on Malabar Hill, by the Hon. Mr. Justice Parsons.

The following papers were then read :—

"Bird Catching Spiders." (Note by Mr. A. W. Morris.)

"Proposed English Nomenclature for Indian Butterflies." (Note by Mr. A. Newnham, B. S. C.)

"Recorded Instances of Children having been Nourished by Wolves and Birds of Prey," by Mr. Jivanji Jamsetji Modi.

Mr. Modi quoted several somewhat similar cases, and referred to a number of instances, in old classical literature, of children having been nourished by wolves and birds of prey.

Dr. G. A. Maconachie, while proposing a vote of thanks to Mr. Modi for his paper, remarked that there appeared to be undoubted evidence that in some cases children had been suckled by wolves, but that the legendary accounts of birds of prey having acted as foster-parents to human offspring were interesting only from a literary point of view and could not be relied upon.

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ON NEW AND LITTLE-KNOWN BUTTERFLIES FROM THE INDIAN REGION, WITH A REVISION OF THE GENUS *PLESIONEURA* OF FELDER AND OF AUTHORS.

By Lionel de Nicéville, F.E.S., C.M.Z.S., &c.

(With Plates A, B.)

Subfamily SATYRINÆ.

1. LETHE TRISTIGMATA, Elwes, Pl. A, Fig. 4, ♀.

L. tristigmata, Elwes, Proc. Zool. Soc. Lond., 1887, p. 444; idem, id., Trans. Ent. Soc. Lond., 1888, p 318, n. 50, pl viii, fig. 1, *male*.

Habitat: Sikkim.

Expanse: ♀, 2·6 inches.

Description: Female. Upperside, *both wings* coloured as in the male. *Forewing* with the dark transverse band towards the end of the cell enclosing a paler space, and the zigzag discal band beyond the cell more prominent, the latter more distinctly outwardly defined with lighter; the submarginal series of five round spots from the costa to the second median interspace much larger and more prominent. *Hindwing* with the markings as in the male, but all larger and darker, the ferruginous marginal line very distinct, defined on both sides by a very fine dark line. Underside, *both wings* marked as in the male, but all the bands and spots larger and more prominent, the ground colour strongly tinged with clear ochreous.

The unique female specimen above described is contained in Mr. Otto Möller's collection, and was obtained at Kala Pookri, 10,000 feet, in Native Sikkim, on 19th July, 1888.

2. MYCALESIS (*Samanta*) MISENUS, n. sp., Pl. A, Fig. 8, ♂.

HABITAT: Sikkim, Khasi Hills.

EXPANSE: ♂, 2·2 to 2·4; ♀, 2·4 to 2·6 inches.

DESCRIPTION: MALE and FEMALE. UPPERSIDE, *both wings* may be known from *M. nicotia*, Doubleday and Hewitson (this being the rains-form, while *M. langi*, de Nicéville, is the dry-season form of one species), by the ground-colour being darker, the ocellus of the *forewing* in the first median interspace almost invariably smaller. UNDERSIDE, *both wings* with the ground-colour fuscous instead of pale brown, the striations pale brown instead of ochreous. MALE may be known by the "scent-fan" below the costa of the hindwing on the upperside being ochreous, in both forms of *M. nicotia* it is deep black.

Mr. Otto Möller and I independently discriminated this species as distinct from *M. nicotia* by the conspicuously darker ground-colour of the underside; it was only afterwards that the marked difference between the two species in the colour of the hairs of the "scent-fan" was noticed. With a darker ground-colour in *M. misenus* one would expect to find these hairs darker (had this been possible) than in *M. nicotia*, but the contrary is the case.

I have described this species from three males and two females from Sikkim obtained by Mr. Otto Möller (from April 1st to May 1st, *i.e.*, in the dry-season), and two males and four females from the Khasi Hills by the Rev. Walter A. Hamilton. It appears probable that this species only occurs in the ocellated form, as is the case in *M.* (*Samanta*) *heri*, Moore, and *M.* (*Pachama*) *suaveolens*, Wood-Mason and de Nicéville. Mr. Elwes seems to have misunderstood *M. nicotia*,* but I think that the above remarks will enable any one to discriminate between that species and *M. misenus*. The upperside of typical *M. nicotia* is well figured in the "Genera of Diurnal Lepidoptera;" I also have given a good figure of both sides of the non-ocellated form of it (*M. langi*) in Trans. Ent. Soc. Lond., 1884, pl. iii, fig. 3, *male*. Mr. Elwes' figure of *M. nicotia* does not show the basal striation of the underside, which is a most characteristic feature of the species, and appears to have been drawn from a female of *M. suaveolens*.

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* Trans. Ent. Soc. Lond., 1888, p. 306, n. 25, pl. ix, fig 5, *female*.

3. YPTHIMA LYCUS, n. sp., Pl. A, Fig. 2, ♂.

Y. motschulskii, Marshall and de Nicéville (*nec* Bremer and Grey), Butt. of India, vol. ii, p. 214, n. 202 (1883).

HABITAT: Khasi hills.

EXPANSE: 1·5 to 1·6 inches.

DESCRIPTION: MALE. UPPERSIDE, *both wings* dark glossy brown, *cilia* paler brown. *Forewing* with a small black bipupilled subapical ocellus with a pale ochreous obscure outer ring; a broad oblique black patch of scales, differently formed from those on the rest of the wing from the inner margin to the middle of the disc. *Hindwing* with a small well-formed round ocellus in the first median interspace. UNDERSIDE, *both wings* dull brown, finely and densely striated with pale ochreous. *Forewing* with the ocellus of the upperside but larger, with an outer broad yellow ring. *Hindwing* with a large subapical ocellus, a slightly smaller one in the first median interspace, a still smaller bipupilled one at the anal angle—in one specimen this latter ocellus is round and bears a single pupil only—all these ocelli black, with a prominent silver pupil and an outer yellow and lastly a fine dark ring. FEMALE, paler throughout than the male, but does not otherwise differ except in the absence of the "male mark," and the geater prominence of the subapical ocellus of the forewing on the upperside.

Through the kindness of Mr. J. H. Leech, who has sent me a male of the true *Y. motschulskii*, Bremer and Grey, from China, I am able to discriminate between that species and its Indian ally. The latter is considerably smaller, has narrower wings, darker cilia, no dark submarginal line to either wing on the upperside, and differs conspicuously in the hindwing on the underside being brown with very fine pale ochreous striation; in *Y. motschulskii* the ground-colour is white, with coarse dark brown striation.

As far as I am at present aware, *Y. lycus* occurs only near Shillong in the Khasi hills, flying at any rate from March to July, and has no non-ocellated form.

Subfamily NYMPHALINÆ.

4. ARGYNNIS CLARA, Blanchard, Pl. A, Fig. 6, ♀.

A. clara, Blanchard, Jacquemont's Voy. dans l'Inde vol. iv, Zoologie—Insectes, p. 20, n. 14, Insectes pl. ii, figs. 2, 3, *male* (1844); id., de Nicéville, Butt. of India, vol. ii, p. 136, n. 428 (1886).

HABITAT: Tihri Garhwal, Western Himalayas.

EXPANSE: ♀, 2·2 inches.

DESCRIPTION: FEMALE. UPPERSIDE, *both wings* with the fulvous coloration of the male almost entirely overlaid with dark bronzy-greenish scales, all the black markings larger. *Forewing* with the middle spot in the cell placed upon a fulvous ground, the disc with fulvous streaks between the veins, a submarginal series of whitish spots. *Hindwing* with a prominent series of rich fulvous spots, extending between the two inner discal series of black spots, no other fulvous markings whatever. UNDERSIDE, *both wings* as in the male.

Mr. P. W. Mackinnon obtained this species in large numbers through his native collectors in several places in Tihri Garhwal at considerable elevations in August. The specimens were mostly somewhat worn; it probably emerges about the middle of July.

Family LYCÆNIDÆ.

5. BIDUANDA CINESOIDES, n. sp., Pl. A, Fig. 7, ♂.

HABITAT: Selangore, Malay Peninsula.

EXPANSE: ♂, 1·6 inches.

DESCRIPTION: MALE. UPPERSIDE, *both wings* violet-blue. *Forewing* with a marginal narrow black line; a large round black glandular patch of modified scales beyond the ends of the cell, extending slightly into it, anteriorly bounded by the upper discoidal nervule, posteriorly by the second median nervule. *Hindwing* with an oblique black band extending from the base of the short outermost tail to the abdominal margin above the anal notch, beyond which the outer margin is white, bearing a very fine black line; the tails white, black at their bases; a very large intensely black elongated patch of modified glandular scales below the costa. *Cilia* of the forewing blackish, of the hindwing anteriorly blackish, posteriorly white. UNDERSIDE, *forewing* orange-rufous, the inner margin broadly pale and highly polished. *Hindwing* with the anterior half orange-rufous, gradually merging into the white area of the posterior half of the wing; an oblique zigzag narrow black band extending from the middle of the abdominal margin to near the end of the second subcostal nervule, where the band is much attenuated and turned upwards parallel with the outer margin; beyond this narrow band is another still narrower and more zigzag band enclosing a ferruginous line, with a band of metallic amethystine-violet placed outwardly against it, the inner portion of the latter above the anal notch enclosed by a short black line centred with ferruginous; a black spot on the anal lobe, and another larger one in the first median interspace just within the margin; a fine marginal black line; tails as above.

Very near to the "*Myrina*" *cinesia* of Hewitson,* from Borneo, from which it appears to differ in the presence of the "male-mark" on the upperside of the forewing; on the upperside of the hindwing there is a black band in the anal region, with a considerable white band beyond it, which latter is not found in *B. cinesia*, and on the underside of the hindwing in the inner black band being half as wide, the outer band also much narrower, and enclosing a ferruginous line, in *B. cinesia* it is wholly black; the middle tail is also more than one-third longer in my species.

6. ZEPHYRUS ZOA, n. sp., Pl. A, Fig. 3, ♂.

HABITAT: Sikkim.

EXPANSE: ♂, 2·0 inches.

DESCRIPTION: MALE. UPPERSIDE, *both wings* black. *Forewing* with all but the outer margin (which is somewhat broadly and evenly of the ground-colour) and the veins (which are black) clothed with powdery rich metallic iridescent dark green scales; this colour in some lights is quite invisible. *Hindwing* with a patch of similar green scales in the middle of the wing, the costa and outer margin being broadly of the ground-colour, the abdominal margin a little paler fuscous. UNDERSIDE, *both wings* dull fuliginous black. *Forewing* with a deeper black disco-cellular mark outwardly defined by a fine silvery white line; an indistinct, somewhat broad, straight blackish discal band from the costa to the first median nervule outwardly defined by a fine silvery white line; an indistinct blackish submarginal band which widens out on either side of the first median nervule, and is there rather prominent. *Hindwing* with a short blackish bar near the base of the costal interspace inwardly defined by a fine silvery white line; a narrow disco-cellular line outwardly surrounded with white; the usual W-shaped discal prominent line, silvery white inwardly, slightly defined by a narrow blackish line; the outer margin broadly sprinkled with white scales; a prominent marginal large oval deep black spot circled with orange in the first median interspace; an anal deep black spot crowned with orange, which latter colour extends on one side to the first median nervule, on the other in a narrow line for some short distance up the abdominal margin, where it is inwardly bounded by a fine black line and then by a line of turquoise-blue; a fine anteciliary white line, obsolete towards the apex. *Thorax* above anteriorly clothed with hairs, which are ferruginous in some lights, posteriorly with green hairs; *abdomen* black above, pale fuscous below.

**Myrina cinesia*, Hewitson, Ill. Diurn. Lep., p. 29, n. 5, pl. xiii, figs. 18, 19, *male* 20, *female* (1863).

This species belongs to the group which contains *Thecla* [*Zephyrus*] *tsangkie*, Oberthür, and *T. desgodinsi*, Oberthür,* from Thibet, but appears to be quite distinct from either. It differs from the former in being larger; it has no brilliant blue spots on the margin of the hindwing on the upperside on either side of the tail, and the colour of the underside is black, not brown. From the latter (of which the female only is known) it also differs in the ground-colour of the underside, and in the discal white lines being straight, instead of outwardly convex as in *T. desgodinsi*, and in the presence of the bar in the costal interspace on the hindwing. *T. diamantina*, Oberthür,† which is also of this group, appears to have the green colour on the upperside of the male less powdery, and reaches much nearer to the outer margin. It was described from the Isle of Askold. From the description alone *Z. zoa* appears to come very near to "*Dipsas*" *japonica*, Murray,‡ but that species is said to have no disco-cellular markings on the underside, and has also a third black spot with whitish scales in the middle between the two large ones on either side of it on the underside of the hindwing near the anal angle not found in my species. To judge of it also from the late Mr. H. Pryer's figures in his "Rhopalocera Nihonica" the male has the green coloration of the upperside much more extensive than in *Z. zoa*.

A single specimen has been obtained by Mr. A. V. Knyvett on Tiger's Hill, above Darjiling at 8,000 feet elevation, on 26th June, 1888.

7. ARHOPALA AIDA, n. sp., Pl. A, Fig. 1, ♂.

HABITAT: Pegu Yoma; Mergui; Tenasserim Valley.

EXPANSE: ♂, 1·60; ♀, 1·45 inches.

DESCRIPTION: MALE. UPPERSIDE, *both wings* shining bluish-purple, of exactly the same tint as in *A. selta*, Hewitson, and *A. rafflesii*, mihi. *Forewing* with the outer margin broadly black (a little broader than in *A. selta*). *Hindwing* with the outer black margin even, as broad as in the forewing; the costa more broadly black. UNDERSIDE, *both wings* purplish-brown, strongly glossed with purple, all the markings prominent, a little darker than the ground-colour, outwardly narrowly and clearly defined with whitish. *Forewing* with the inner margin broadly paler; an oval spot near the base of the cell; an oblong one at its middle, with a costal spot above it; a quadrate spot closing the cell, also with a costal spot above it; a discal macular band dislocated below the third median nervule, the fourth spot nearer the margin, the two spots which follow further removed from the margin, a large quadrate spot in continuation in the submedian interspace; a pair of submarginal fasciæ, but more prominent than usual. *Hindwing* with the usual basal annular spots, a spot closing the cell, a discal band formed of spots arranged more or less in pairs, the usual marginal lunular fasciæ, the small anal lobe black, a small black spot in the first median interspace on the margin, the space between this spot and the anal angle sprinkled with metallic-green scales. FEMALE. UPPERSIDE, *both wings* of a lighter more bluish shade than in the male, the outer margins much broader; otherwise as in the male.

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* Etudes d'Ent., vol. xi, pp. 20, 21, pl. vii, figs. 54—56 (1886).

† Etudes d'Ent., vol. v, p. 18, n. 45, pl. i, fig. 1, *male* (1880).

‡ Ent. Month. Mag., vol. xi, p. 169 (1875).

Described from a single male (the type) captured by Major C. T. Bingham on the Pegu Yoma, Burma, in December, 1887, and two males and a female captured by Mr. W. Doherty at Mergui and in the Tenasserim Valley, in the cold season of 1888-89. One of these males differs slightly from the type in having all the markings of the underside rather larger and darker, and consequently more prominent.

Subfamily PAPILIONINÆ.

8. PAPILIO (*Euplœopsis*) TELEARCHUS, Hewitson, Pl. A, Fig. 5, ♀.

P. telearchus, Hewitson, Trans. Ent. Soc. Lond., second series, vol. ii, p. 22, pl. vi, fig. 3, *male* (1852); *P.* (*Euplœopsis*) *telearchus*, Elwes and de Nicéville, Journ. A. S. B., vol. lv, pt. 2, p. 433, n. 122 (1887); *Isamiopsis telearchus*, Moore, Desc. Lep. Coll. Atkinson, p. 285 (1888).

HABITAT: Assam, Tavoy, Ponsekai.

EXPANSE: ♀, 5·4 inches.

DESCRIPTION: FEMALE. UPPERSIDE. *Forewing* brown; costa black basally; a longitudinal streak in the lower basal two-thirds of the discoidal cell, a small streak at the base of the second median interspace, a larger one at the base of the first median interspace, a pair of streaks in the submedian interspace, outwardly joined to two oval whitish spots, a large streak on the inner margin—all greyish-ochreous; the apical half of the wing including the outer third of the cell dark brown strongly glossed with purple; an oval spot at the lower outer end of the cell, a discal series of seven spots, and a submarginal series of nine—all white more or less edged with purple of a lighter shade than the purple-glossed ground-colour. *Hindwing* brown; a streak in the cell, and eight streaks round it, one in each interspace—greyish-ochreous; a submarginal series of seven pale ochreous-whitish spots, the upper one oval, the rest dentate; seven small white spots on the margin, one in each interspace. UNDERSIDE, *both wings* dull brown, the spots and streaks as above. *Forewing* entirely lacking the purple gloss, and the purple edging to the spots. *Antennæ* black; *head, thorax* and *abdomen* black, streaked and spotted with white.

The female of *P. telearchus* is now described for the first time. It is the only specimen of that sex I have seen, though the males are by no means very rare. It is probable that both sexes mimic the corresponding sexes of *Euplœa* (*Trepsichrois*) *midamus*, Linnæus (= *T. linnæi*, Moore), which is certainly the commonest species of the genus in the regions where *P. telearchus* is found. Mr. Moore suggests that it mimics *Euplœa* (*Isamia*) *splendens*, Butler (= *E. rogenhoferi*, Felder). I much doubt this, as that species is always a rare one wherever it occurs; at any rate the female of *P. telearchus* does not mimic it, the opposite sexes of *E. rogenhoferi* being superficially the same, while the female of *P. telearchus* differs widely from the male in coloration and markings as do the opposite sexes of *E. midamus*.

I am indebted to the Rev. Walter A. Hamilton for the loan of the specimen described above. It was obtained by his native collectors in the Khasi Hills below Shillong.

Family HESPERIIDÆ.

9. HASORA ANURA, n. sp., Pl. B, Figs. 5, ♂; 1, ♀.

HABITAT: Sikkim, Khasi Hills.

EXPANSE: ♂ ♀, 2·1 inches.

DESCRIPTION: MALE. UPPERSIDE, *both wings* deep bronzy-brown; the base and disc thickly clothed with long ochreous-brown hairs; *cilia* ochreous-brown. *Forewing* with a minute subapical transparent shining yellow dot. UNDERSIDE, *both wings* dark brown, somewhat glossed with purple. *Forewing* with the inner margin broadly pale, a broad discal dark band free from purple gloss. *Hindwing* with the basal two-thirds much darker than the outer third, the dark portion well-defined, bearing towards the abdominal margin on the dividing edge a small prominent ochreous spot, an ochreous anteciliary line from the anal angle to the first median nervule, the ochreous spot and line obscure in one specimen; a prominent whitish spot in the middle of the disc in one specimen, obscure in the other. FAMALE. UPPERSIDE, *both wings* coloured as in the male. *Forewing* with a quadrate spot at the end of the cell, an elongate one below across the first median interspace, its inner edge straight, its outer edge concave; another smaller narrow spot constricted in the middle across the middle of the second median interspace; three increasing subapical dots—all these spots shining translucent rich ochreous. UNDERSIDE, *forewing* with the spots of the upperside showing through, the inner margin broadly bright ochreous, otherwise as in the male.

Closely allied to the common *Hasora badra*, Moore, from which it differs in both sexes in having no large anal lobe to the hindwing, this lobe being present in *H. badra* and coloured black on the underside, of which black patch there is no trace in *H. anura*; the latter also is a smaller insect; the female differs in having the three large discal yellow spots of the forewing considerably smaller, and of a deeper richer yellow.

Described from two male and four female specimens in Mr. Otto Möller's collection which shew hardly any variation. They have been selected from ninety-three males and forty-five females of *H. badra*, a very common species in Sikkim, in Mr. Möller's collection. The complete absence of the large anal lobe or tail in *H. anura* makes it distinguishable from *H. badra* at a glance. There is also a specimen of this species from Sikkim in the collection of Mr. G. C. Dudgeon, and a male from Shillong in the collection of the Indian Museum, Calcutta. This latter specimen was submitted for determination to Mr. F. Moore, who pronounced it to be a variety of *H. badra*, but I believe it to be a good species.

I may note that the *Hasora vitta* of Distant* is the *H. coulteri* of Wood-Mason and de Nicéville.† A specimen from Perak is in the

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* Rhop. Malay p. 375, n. 2, pl. xxxv, fig. 4, *male* (1886).

† Journ. A. S. B. vol. lv, pt. 2, p. 378, n. 201, pl. xviii, fig. 8, *male*; 8*a*, 8*b*, *female* (1886).

Indian Museum, Calcutta, and differs from the type male specimen from Cachar in possessing two minute semi-transparent yellow dots on the disc of the forewing, and a similar spot in the discoidal cell of the hindwing on the underside, characters of no importance. The true *H. vitta*, Butler, which is from Sarawak, Borneo, may be known from *H. coulteri* by having the basal area of the hindwing on the underside glossed with green (*virescente*); this is not found in *H. coulteri.*

10. HASORA HADRIA, n. sp.

? *Hesperia badra*, Butler (*nec* Moore), Trans. Linn. Soc. Lond., Zoology, second series, vol. i, p. 554, n. 3 (1877); *Hasora badra*, Distant, (*nec* Moore), Rhop. Malay, p. 374, n. i, pl. xxx, fig. 3, *male* (1886).

HABITAT: Perak, ? Malacca.

EXPANSE: ♂, 2·1 inches.

DESCRIPTION: MALE. UPPERSIDE, *both wings* as in *H. anura*, mihis. *Forewing* lacking the subapical yellow dot (this however is a trivial character). UNDERSIDE, *both wings* dull brown, not slightly glossed with purple as in *H. anura*, or strongly so as in *H. badra*, Moore. *Hindwing* with a small anal lobe bearing a black patch, in *H. anura* there is no black patch or anal lobe, in *H. badra* both are large. This species is probably variable with regard to the presence or absence of a white or greyish spot in the cell of the hindwing on the underside, and a white or greyish streak above the anal angle, as in the two allied species above-named; Mr. Distant describing a "*var.*" of this species as lacking these characters.

I have not figured this species, as Mr. Distant has done so in his "Rhopalocera Malayana." I have described it from a single male from Perak in the collection of the Indian Museum, Calcutta, which Mr. Distant ticketed "*Hasora badra*, Moore (var.)" I am unable to say whether or not *H. badra* occurs in Malacca, Johore, Java, Borneo, Celebes and the Philippines (localities given for *H. badra* by Messrs. Distant and Butler). The true *H. badra*, Moore, occurs in Sikkim, Assam, Calcutta (one female taken by Colonel G. F. L. Marshall, R.E., in his room at midnight in February), Ceylon, Chittagong, Moulmein, and the Andaman Isles (a single female).

11. PARNARA PHOLUS, n. sp., Pl, B, Fig. 3, ☿.

HABITAT: Bhutan.

EXPANSE: ♂, 2·4; ♀, 2·6 inches.

DESCRIPTION: MALE. UPPERSIDE, *both wings* rich brown with a shining vinous tinge, the spots translucent rich ochreous. *Forewing* with three conjugated subapical spots, the first a mere dot, the next twice as large, the lowest four times as large as the middle spot; two well-separated spots towards the end of the cell placed inwardly obliquely; a spot about twice the size of these in the middle of the second median interspace, another much larger one completely filling the first median interspace below the innermost spot in the cell, another spot below this at about the middle of the submedian interspace and touching that nervure. *Cilia* concolorous with the wing. *Hindwing* with a small round spot near the end of the cell, three equal-sized spots in a straight line on the disc separated by the second and third median nervules; the base of the wing and the abdominal margin clothed with long yellowish-brown setæ. *Cilia* pale yellow. UNDERSIDE, *both wings* as above, but the coloration duller. *Forewing* with the spot in the submedian interspace much larger, its edges diffused, pale yellow. *Hindwing* as on the upperside. *Antennæ* and *legs* black throughout; top of *head*, *thorax*, and top of *abdomen* decreasingly clothed with long iridescent bronze-green hairs, thorax below duller. FEMALE, larger than the male. *Forewing* with the lowest subapical spot larger than in the male, the two spots in the cell conjoined. Otherwise as in the male.

Described from a male obtained by Mrs. Wylly, and a female by the native collectors of Mr. Otto Möller, near Buxa, Bhutan, in August. I know of no near ally to this fine species, the largest in the genus hitherto described.

12. PARNARA SARALA, n. sp., Pl. B., Fig. 6, ♀.

HABITAT: Khasi Hills.

EXPANSE: ♂, 1·8; ♀, 2·0 inches.

DESCRIPTION: FEMALE. UPPERSIDE, *both wings* dark bronzy-fuscous. *Forewing* with a large medially constricted spot at the end of the cell; an elongated spot at the base of the second median interspace; a much larger one towards the base of the first median interspace, its outer end concave, its inner end convex, anteriorly and posteriorly touching the second and first median nervules; a comma-shaped spot in the submedian interspace, touching the middle of the submedian nervure—all these spots semi-transparent lustrous white; *cilia* fuscous. *Hindwing* with a large oval pale yellow patch on the middle of the disc; and a small patch on the abdominal margin near the base of the wing; *cilia* rich chrome-yellow at the anal angle, gradually shading off into fuscous anteriorly. UNDERSIDE, *both wings* distinctly glossed with rich purple.

Forewing with the three discal spots as above, the one in the submedian interspace on the upperside developed into a large outwardly-diffused white patch occupying the middle of the inner margin; a large chrome-yellow quadrate patch above the spot in the cell extending from the subcostal nervure to the costa. *Hindwing* with the oval pale yellow discal patch of the upper-side developed into a broad anteriorly-increasing discal chrome-yellow band extending from the abdominal margin to the costa, but with a break between the submedian and internal nervures. *Palpi, thorax,* and *abdomen* above and below clothed with bronzy-green iridescent hairs; *antennæ* with shaft black, club broken off.

The Rev. Walter A. Hamilton, who obtained the two specimens above described, possesses the wings only of a third specimen placed between talc of what appears to be the male of this species captured in the same locality. In the forewing there are two small well-separated spots in the cell instead of one large one, the two spots below are smaller, the spot in the submedian interspace entirely wanting; otherwise as in the female. This specimen does not apparently possess any secondary sexual characters.

I do not know any near ally to *P. sarala.* The shape of the wings agrees with that of the species of the genus *Parnara,* the probable male having the forewing less broad, the apex more acute and the outer margin more straight and inwardly oblique than in the female.

13. PARNARA PARCA, n. sp., Pl. B, Fig. 10, ♀.

HABITAT: Sikkim, Khasi Hills.

EXPANSE: ♀, 1·9 inches.

DESCRIPTION: FEMALE. UPPERSIDE, *both wings* deep vinous-brown. *Forewing* with three small subapical spots forming half a circle; two elongated well-separated spots at the end of the discoidal cell; a rhomboidal spot near the middle of the second median interspace; another occupying a similar position in the first median interspace, anteriorly and posteriorly bounded by the second and first median nervules, its inner end well rounded, its outer end convex and the lower corner produced; a rounded spot in the submedian interspace touching that nervure a little beyond its middle—all these spots semi-transparent lustrous white; *cilia* from the inner angle to the second median nervule dull ochreous, anteriorly of the colour of the wing. *Hindwing* with five nearly equal-sized spots forming a rough oval on the disc, the two lowest spots nearer together than the rest; these spots are translucent white in some lights, metallic pale brassy-greenish in others; *cilia* broadly rich chrome-yellow from the anal angle to the termination of the third median nervule, thence to the apex of the wing vinous-brown. UNDERSIDE, *both wings* of the colour of the upperside. *Forewing* with the spots as on the upperside; the dull ochreous *cilia* of the upperside pale clear yellow, that colour extending a little distance on to the wing. *Hindwing* also with the spots as above; the chrome-yellow *cilia* of the upperside is pale clear yellow on the underside, that colour extending irregularly on to the wing membrane beyond. *Antennæ* with the shaft black, becoming ochreous just before the black club; *abdomen* tipped with long chrome-yellow hairs; rest of body, *head* and *palpi* more or less concolorous with the wings; *femur* and *tibia* of legs black and clothed with very long thick and closely-set black hairs, tarsus anteriorly black, posteriorly deep chrome-yellow, naked.

I place this species but doubtfully in the genus *Parnara,* all the legs being strongly setose, being a character not found in any species of that genus known to me. A somewhat similar character is found in the males only of *Abaratha syrichthus,* Felder, *A. ransonnetii,* Felder, and *A. taylorii,* mihi, all of which possess a tuft of black hairs over a quarter of an inch in length attached to the coxæ of the front legs, and ordinarily lying along the pectus of the butterfly between the middle and hindlegs. These bunches of hairs are probably scent-fans, and are, moreover, probably susceptible of erection and expansion, but accurate observations on the subject on live specimens are desirable. In describing the genus *Abaratha,** Mr. Moore stated that the legs are naked, this is certainly not the case with the front legs of the males of the type species. Mr. Distant† is also incorrect in saying that the hindlegs of the type species of the genus are strongly pilose, this applies to the forelegs of the male only. It is also quite certain that the species Mr. Distant places in the genus *Abaratha* (*sura,* Moore, and *pygela,* Hewitson), possess a setose clothing quite different to that found in the true *Abarathas:* these species, I think, should be placed in another genus. In the genus *Casyapa,* Kirby, the males have the tibia of the hindlegs extremely hairy.

P. parca is described from a single specimen in my collection obtained by the Rev. Walter A. Hamilton in the Khasi Hills, who possesses the wings of a second example placed between talc from the same region, I also possess another female from Sikkim. I do not know any species at all similarly marked to *P. parca.*

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* Lep. Ceylon, vol. i, p. 181 (1881).

† Rhop. Malay., p. 390 (1886).

14. CHAPRA MATHIAS, Fabricius, Pl. B, Fig. 7, ♂.

Hesperta mathias, Fabricius, Ent. Syst., Suppl., p. 433, n. 289-90 (1798).

I have figured what I believe to be a very unusual variety of this species captured at Pilibhit, Kumaon, by Colonel A. M. Lang, R. E., on 16th December, 1887. It is a male, and has a very prominent spot in the lower subcostal interspace of the hindwing; this spot is semi-transparent, and shews on both sides of the wing. Mr. Elwes refers to this rare varietal form in his paper on the "Lepidoptera of Sikkim."* My specimen has also a pale diffused band on the underside of the forewing just within the dark anteciliary thread extending from the apex of the wing to the first median nervule; also a large similarly-coloured discal patch on the hindwing, and a marginal band.

15. HALPE AINA, n. sp., Pl. B, Fig. 8, ♂.

Habitat: Sikkim.

Expanse: ♂, 1·36 to 1·44 inches.

Description: Nearest to *H. kumara,* mihi,† of which Mr. Otto Möller possesses eighteen specimens and I six, all from Sikkim. Male. Upperside, *both wings* of a more tawny-ferruginous colour, due to the entire forewing and the basal two-thirds of the hindwing being clothed with a thick coating of long hair-like ferruginous scales placed upon a deep brown ground. *Forewing* with two conjoined spots in the discoidal cell, the upper spot answering to the single spot of *H. kumara,* the lower spot twice as large as the upper; three instead of two increasing conjoined subapical spots; the two discal spots much the same: the "male-mark," however, instead of being a long continuous black streak of modified scales as in *H. kumara* presents the appearance of two obliquely-placed yellow spots exactly as in *H. gupta,* mihi,‡ which can be teazed out by a pin-point into a quantity of fluffy material like down. Underside, *both wings* coloured much as in *H. kumara.* *Forewing* with the translucent yellow spots as on the upperside. *Hindwing* unmarked in eight specimens, in one specimen with two opaque pale yellow discal spots.

Described from five male specimens in the collection of Mr. Otto Möller, and four in my own.

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* Trans. Ent. Soc. Lond., 1888, p 444, n. 462.

† Journ. A. S. B., vol. liv, pt. 2, p. 121, pl. ii, fig. 10, *male* (1885).

‡ Journ. A. S. B., vol. lv, pt. 2, p. 254, n. 8, pl. xi, fig. 1, *male* (1886.)

16. HESPERIA HELLAS, n. sp., Pl. B, Fig. 9, ♂.

Habitat: Campbellpur (Punjab).

Expanse: 1·05 inches.

Description: Very close to *H. galba*, Fabricius (*superna*, Moore, *evanidus*, Butler, and *evanidus*, var. *adenensis*, Butler), from which it differs on the upperside of *both wings* in the white spots being smaller and fewer in number, the discal macular band on the *hindwing* narrower, and notably the underside of the *hindwing* unspotted, but bearing three equi-distant white bands, the first subbasal, somewhat obscure; the second discal, with nearly regular edges, of nearly equal breadth throughout, unbroken, extending from the costa to the white abdominal streak; the third obscure, marginal.

I possess two specimens of this species collected by Major J. W. Yerbury. They can at once be distinguished from the very numerous specimens of *H. galba* before me from Aden, Sind, and indeed from almost all parts of India (the type was from Tranquebar), and from Ceylon, by the prominence and regularity of the bands of the hindwing on the underside, especially the medial one. In *H. galba* the medial band is usually continuous, but it always has very irregular edges, it is often broken up into groups of spots, particularly in some specimens from Aden, and is described as characteristic of *H. evanidus*; this does not, however, appear to be a constant feature, as I find from an examination of specimens from the Hubb river in Colonel Swinhoe's collection, which were captured with the types of that species. Colonel Swinhoe, in his two papers on the Lepidoptera of Karachi, records both *H. galba* and *H. evanidus* from that city, but on a careful examination of his series of both species I am unable to say by what character he separated them, every gradation, as far as I can see, occurring between typical *H. galba* with the medial band on the underside of the hindwing unbroken and typical *H. evanidus* with the band divided into three well-separated spots. I find the same variation also in specimens from Aden.

Genus CELÆNORRHINUS, Hübner.

Celænorrhinus, Hübner, Verz. bek. Schmett., p, 106 (1816); id., Plötz, Berl. Ent. Zeitsch., vol. xxvi, p. 253 (1882); *Gehlota*, Doherty, Journ. A. S. B. vol. lviii, pt. 2, p. 131 (1889); *Plesioneura* (preoc.), part, auctorum.

Forewing, *costa* slightly arched, *apex* rather acute, *outer margin* convex, *inner* margin straight; *costal nervure* terminating opposite the apex of the discoidal cell, *first, second,* and *third subcostal nervules* with their bases almost equi-distant, *fourth* subcostal with its base half as near to the base of the third subcostal as that vein is to the second, terminating at the apex of the wing, terminal portion of *subcostal nervure* or fifth subcostal nervule with its base almost touching that of the fourth, terminating on the outer margin far below the apex of the wing; *discoidal cell* long, narrow; *upper disco-cellular nervule* straight, strongly outwardly oblique, very short; *middle* and *lower* disco-cellular nervules almost in the same straight line (the lower a little concave), the lower a little longer than the upper, both veins taken together strongly inwardly oblique; *second median* nervule arising some little distance before the lower end of the cell, *first* median nervule arising much nearer to the base of the wing than to the point where the second median is given off; *submedian nervure* slightly recurved; *internal* nervure short and quickly running into the submedian nervure, with which it entirely anastomoses. HINDWING, *costa* strongly arched at base then straight to *apex,* which latter is somewhat acute in the male, rounded in the female, *outer margin* rounded, *inner* margin convex; *costal nervure* almost straight, terminating just before the apex of the wing; *first subcostal nervule* originating some distance before the apex of the cell; *upper disco-cellular* nervule straight, very slightly outwardly oblique; *lower* disco-cellular also slightly outwardly oblique, at first concave, then straight, a little longer than the upper disco-cellular; *discoidal* nervule very fine, straight, arising at the point of junction of the disco-cellular nervules; *second median* nervule arising just before the lower end of the cell, *first* median arising much nearer the lower end of the cell, than the base of the wing; *submedian* and *internal nervures* straight. Type,* the *Papilio eligius* of Cramer.

This diagnosis has been made from bleached wings of both sexes of the "*Hesperia*" *leucocera,* of Kollar, from Simla, and of the "*Papilio*" *eligius* of Cramer from the Amazons, for the specimens of which latter I am indebted to Dr. O. Staudinger. All the species of the genus settle with wide outspread wings, which at once distinguishes them in life from the genus *Notocrypta,* mihi, the species of which rest with wings folded upright over the back. *C. leucocera*

**Vide* Mr. Samuel H. Scudder's "Historical Sketch of the Generic Names proposed for Butterflies," in Proc. Am. Acad. Arts and Sciences, vol. x, p. 137 (1875).

in the Western Himalayas is markedly crepuscular, I have seen specimens over and over again flying up and down a short distance of the bed of the Simla river with immense rapidity, so fast that the eye can hardly follow them, settling on a leaf for a second and then flying off again, long after the sun has set. All that are known to me have the hindwing more or less spotted. *C. eligius*, Cramer, was described from Surinam in South America, and Felder states that he has received a specimen from Venezuela. The similarity in the markings of the forewing of this species to those of *C. maculosa*, Felder, from Shanghai, is not a little remarkable. The transformations of only one species are known, those of *C. spilothyrus*, Felder.

(1) CELÆNORRHINUS ELIGIUS, Cramer.

Papilio eligius, Cramer, Pap. Ex., vol. iv, p. 123, pl. cccliv, fig. H (1781); *Celænorrhinus eligius*, Hübner, Verz. bek. Schmett., p. 106, n. 1142 (1816); *Eudamus eligius*, Felder, Wien. Ent. Monatsch., vol. vi, p. 182, n. 165 (1862); *Tagiades eligius*, Plötz, Jahr. des Nass. Ver. Natur., vol. xxxvii, p. 50, n. 45 (1884); *Plesioneura eligius*, Staudinger, Ex. Schmett., p. 300, pl. c, *male* (1888).

HABITAT: Surinam (*Cramer*); Venezuela (*Felder*); Brazil (*Plötz*); South Brazil, Chanchamayo, Venezuela, Columbia, and Chiriqui (*Staudinger*).

(2) CELÆNORRHINUS VULTURNUS, Felder.

Eudamus vulturnus, Felder, Wien. Ent. Monatsch., vol. vi, p. 182, n. 165 (1862).

HABITAT: River Negro, South Brazil (*Felder*).

(3) ? CELÆNORRHINUS COMPRESSA, Möschler.

Plesioneura compressa, Möschler, Verh. zool.-bot. Gesellsch. Wien, vol xxvi, p. 336, pl. iv, fig. 22 (1876).

HABITAT: Surinam.

Note—From the figure and description this species appears to me to belong but doubtfully to this genus.

(4) CELÆNORRHINUS OCHROGUTTA, Möschler.

Plesioneura ochrogutta, Möschler, Verh. zool.-bot. Gesellsch. Wien, vol. xxxii, p. 330, pl. xvii, fig. 22 (1883).

HABITAT: Surinam (*Möschler*).

(5) CELÆNORRHINUS FRITZ-GÆRTNERI, Bailey.

Plesioneura fritz-gærtneri, Bailey, Bull. Brooklyn Soc., vol. iii, p. 62 (1881).

HABITAT: Salvador (?), Central America (*Bailey*).

Note—I have not seen the description of this species. It is referred to in the Zoological Record for 1881, Insects, p. 169.

(6) CELÆNORRHINUS MOKEEZI, Wallengren.

Pterygospidea mokeezi, Wallengren, Kongliga Svenska vet.-akad. Hand., Lep. Rhop. Caff., p. 54, n. 3 (1857); *Nisoniades mokeezi*, Trimen, Rhop. Afr. Austr., p. 316, n. 210, pl. vi, fig. 5, *female* (1866); *Hesperia amaponda*, Trimen, Trans. Ent. Soc. Lond., third series, vol. i, p. 405 (1862).

HABITAT: Caffraria (*Wallengren*); South Africa (*Trimen*).

(7) CELÆNORRHINUS HUMBLOTI, Mabille.

Plesioneura humbloti, Mabille, Ann. Soc. Ent. Belg., vol. xxviii, p. clxxxvii (1884).

HABITAT: Madagascar (*Mabille*).

(8) CELÆNORRHINUS PROXIMA, Mabille.

Plesioneura proxima, Mabille, Bull. Soc. Zool. France, 1877, p. 231.

HABITAT: Congo (*Mabille*).

(9) CELÆNORRHINUS SHEMA, Hewitson.

Pterygospidea shema, Hewitson, Ann. and Mag. of Nat. Hist., fourth series, vol. xx, p. 322 (1877).

HABITAT: Cayenne and Calabar (*Hewitson*).

(10) CELÆNORRHINUS MACULOSA, Felder.

Pterygospidea maculosa, Felder, Reise Novara, Lep., vol. iii, p. 528, n. 934, pl. lxxiii, fig. 7, *male* (1867); id., Elwes, Proc. Zool. Soc. Lond., 1881, p. 911.

HABITAT: Shanghai, South China (*Felder*); China (*Elwes*).

Note—Plötz considered this species to be the same as the next. Elwes says they differ considerably in the markings of the hindwing on the underside.

(11) CELÆNORRHINUS PULOMAYA, Moore.

Plesioneura pulomaya, Moore, Proc. Zool. Soc. Lond., 1865, p. 787; idem, id., op. cit., 882, p. 263; id., Elwes, Trans. Ent. Soc. Lond., 1888, p. 463, n. 532; ? *P. pulomaya*, Doherty, Journ. A. S. B., vol. lv, pt. 2, p. 139, n. 258 (1886); *Hesperia pulomaya*, Horsfield and Moore, Cat. Lep. Mus. E. I. C., vol. i, p. 252, n. 573 (1857); *Tagiades pulomaya*, Plötz, Jahr. des Nass. Ver. Natur., vol. xxxvii, p. 50, n. 47 (1884).

HABITAT: Darjiling and N.-W. Himalayas (*Moore*); Pindari valley, Kumaon, 7—9,000 feet (*Doherty*); Sikkim (*Elwes*); Darjiling (*Horsfield* and *Moore*); South Asia (*Plötz*); Kulu; Masuri; Bhutan.

Note.—This species appears to differ from the preceding in having the spot one-third from the base and the lower of the two spots beyond in the submedian interspace of the forewing on the upperside yellow instead of white, and the cilia of the hindwing very prominently alternately orange and dark brown instead of dark brown intersected with white.

(12) Celænorrhinus flavocincta, de Nicéville.

Plesioneura flavocincta, de Nicéville, Proc. Zool. Soc. Lond., 1887, p. 464, pl. xl, fig. 9, *female*.

Habitat: Buxa, Bhutan (*de Nicéville*).

17. (13) CELÆNORRHINUS PYRRHA, n. sp., Pl. B, Fig. 11, ♀.

Habitat: Bhutan, Assam.

Expanse: ♂, 1·9; ♀, 2·0 to 2·2 inches.

Description: Male. Upperside, *forewing* dark brown, the basal half of the wing clothed with ochreous-yellow scales; a large square spot at the end of the discoidal cell, a rather smaller one below it in the first median interspace, a small one placed outwardly between these two spots in the second median interspace, two still smaller spots placed inwardly obliquely in the submedian interspace below the outer angle of the second spot, the lower one sometimes wanting, five small subapical spots arranged three and two—all these spots semi-transparent diaphanous white; *cilia* dark brown throughout. *Hindwing* dark brown, the basal two-thirds thickly clothed with long ochreous-yellow setæ, some bright yellow spots on the disc; *cilia* alternately dark brown and pale yellow. Underside, *forewing* spotted as above, but the anterior spot in the cell continued almost to the costa by two small white spots divided by the costal nervure, two diffused whitish spots placed in the submedian interspace beyond the two diaphanous spots of the upperside. *Hindwing* with all the spots more prominent and paler yellow than on the upperside. *Antennæ* black below throughout, above with a small portion just before the club shining silvery white, the shaft dotted with white. Female: Upperside, *forewing* as in the male, but in some specimens there is a third white spot in the submedian interspace one-third from the base, and in some specimens also the spot in the cell has two small whitish dots above it almost reaching the costa. *Hindwing* as in the male, but the yellow spots more prominent. Underside, *forewing* as in the male, but with the pair of diffused whitish spots placed beyond the two oblique spots in the submedian interspace more prominent; *cilia* in this interspace often pale yellow. *Hindwing* as in the male. *Antennæ* as in the male.

The male differs from *C. sumitra*, Moore, from N.-E. Bengal (which is known to me by the description only), in having the shaft of the antennæ black anteriorly dotted with white, not anteriorly wholly silvery-white. The male differs from *C. pulomaya*, Moore, from Kulu, Sikkim, and Bhutan in having the lower of the two spots placed obliquely in the submedian interspace of the forewing in both sexes white, in *C. pulomaya* it is yellow. *C. putra*, Moore, from Bengal, is unknown to me; the description agrees, however, with some examples of *C. leucocera*, Kollar.

Described from a single male from Bhutan (I have examined the prehensores, so am certain that the specimen is a male), and six females also from Bhutan, one female from Cherrapunji, and one male and three females from the Khasi Hills.

18. (14) CELÆNORRHINUS PLAGIFERA, n. sp., Pl. B, Fig. 13, ♀.

HABITAT : Sikkim, Bhutan.

EXPANSE : ♂, ♀, 2·0 to 2·3 inches.

DESCRIPTION : MALE and FEMALE. UPPERSIDE, *forewing* differs from *C. pyrrha*, mihi, in never having a spot one-third from the base in the submedian interspace. *Hindwing* with the spots larger, and of a richer (more orange) yellow colour; the alternate yellow portions of the *cilia* also of a deeper orange. UNDERSIDE, *forewing* lacking the two diffused whitish spots in the submedian interspace beyond the two obliquely-placed transparent spots which are found in *C. pyrrha*; otherwise as in that species. *Antennæ* as in *C. pyrrha*.

I have described this species from nineteen specimens in the collections of Mr. A. V. Knyvett and myself. It appears to be very constant. The sexes are very difficult to discriminate; I have been able to distinguish them only by an examination of the organs of generation.

19. (15) CELÆNORRHINUS PATULA, n. sp., Pl. B, Fig. 4, ♀.

HABITAT : Sikkim.

EXPANSE : ♂, 2·2; ♀, 2·5 inches.

DESCRIPTION : MALE. UPPERSIDE, *forewing* with the white spots forming the discal band smaller than in *C. pyrrha* and *C. plagifera*, mihi, no spot at the base of the second median interspace, the lower of the two spots in the submedian interspace minute. *Cilia* anteriorly dark brown, posteriorly pale yellow. *Hindwing* with the yellow spots on the disc larger and clearer than in either the above-mentioned species. *Cilia* almost entirely yellow, instead of being prominently marked with black at the ends of the veins. *Antennæ* with the shaft anteriorly entirely pure silvery-white, in which respect it agrees with *C. sumitra*, Moore, and *C. pero*, mihi. FEMALE. UPPERSIDE, *forewing* with the lower spot in the submedian interspace larger than in the male, as also are the five subapical spots; a minute spot at the base of the second median interspace. *Cilia* posteriorly barely marked with pale yellow. *Antennæ* as in the male.

C. patula differs from the description of *C. sumitra* in having two spots in the submedian interspace of the forewing in both sexes instead of one only, the cilia are not alternately broadly brown and orange-yellow, and the female of *C. patula* lacks the yellow costal spot above the oblique discal series of white spots on the upperside of the forewing described in *C. sumitra*.

Described from a single pair from Sikkim. The female of *C. patula* is unique as far as I know amongst this group of the genus in possessing antennæ that are anteriorly white, this being usually a male character. I am certain of the sex of my type specimens, as I have examined the primary sexual organs.

20. (16) CELÆNORRHINUS PERO, n. sp., Pl. B, Fig. 12, ♂.

HABITAT: India.

EXPANSE: ♂, 2·2 inches.

DESCRIPTION: MALE. UPPERSIDE, *both wings* differ from those of *C. pyrrha*, mihi, in being paler in colour. *Forewing* marked as in that species, but the yellow spot one-third from the base of the wing in the submedian interspace more prominent; *cilia* broadly pale yellow and brown. *Hindwing* as in *C. pyrrha*, but the yellow spots on the disc smaller, and the *cilia* almost entirely pale yellow, only just touched with brown at the ends of the veins, as in *C. patula* and *C. flavocincta*. UNDERSIDE, *both wings* as in *C. pyrrha*, but the spot one-third from the base of the submedian interspace of the *forewing* much larger than on the upperside and white. *Antennæ* shining silvery white anteriorly throughout, posteriorly black. *Palpi* white below instead of pale yellow as in *C. pyrrha*.

C. pero agrees with *C. sumitra* in having the antennæ anteriorly white, but differs from the description of that species in having the palpi and front of the thorax beneath white not pale yellow, and in possessing the additional yellow spot one-third from the base and the white spot one-third from the outer margin in the submedian interspace of the forewing on the upperside.

Described from two male examples from Colonel G. F. L. Marshall's collection. They are not ticketed, but I believe they are from the Western Himalayas.

(17) CELÆNORRHINUS SUMITRA, Moore.

Plesioneura sumitra, Moore, Proc. Zool. Soc. Lond., 1865, p. 787; ? *P. sumitra*, Doherty, Journ. A. S. B., vol. lv, pt. 2, p. 139, n. 257 (1886); *P. sumitra*, Elwes, Trans. Ent. Soc. Lond., 1888, p. 463, n. 533; *Tagiades sumitra*, Plötz, Jahr. des Nass. Ver. Natur., vol. xxxvii, p. 51, n. 51 (1884).

HABITAT: N.-E. Bengal (*Moore*); Pindari valley, 7—9,000 feet; Chaudans, 7,000 feet, both in Kumaon (*Doherty*); Rikisum, British Bhutan, 5—7,000 feet (*Elwes*); Bengal, Sumatra (*Plötz*).

(18) CELÆNORRHINUS EDITUS, Plötz.

Tagiades editus, Plötz, Berl. Ent. Zeitsch., vol. xxix, p. 231, n. 32 (1885).

HABITAT: Aru (*Plötz*).

(19) CELÆNORRHINUS AREA, Plötz.

Tagiades area, Plötz, Berl. Ent. Zeitsch., vol. xxix, p. 231, n. 33 (1885).

HABITAT: Bengal, Celebes (*Plotz*).

Note—This species is quite unknown to me.

(20) CELÆNORRHINUS PUTRA, Moore.

Plesioneura putra, Moore, Proc. Zool. Soc. Lond., 1865, p. 788; *Hesperia putra*, Horsfield and Moore, Cat. Lep. Mus. E. I. C., vol. i, p. 253, n. 575 (1857).

HABITAT: Bengal (*Moore*); Java (*Horsfield* and *Moore*).

Note—I do not know how to distinguish this species from the following. Herr Plötz considered them the same.

(21) CELÆNORRHINUS LEUCOCERA, Kollar.

Hesperia leucocera, Kollar, in Hügel's Kaschmir, vol. iv, pt. 2, p. 454, n. 2, pl. xviii, figs. 3, 4 (1844); id., Westwood, Gen. Diurn. Lep., vol. ii, p. 526, n. 18 (1852); id., Moore, Proc. Zool. Soc. Lond., 1865, p. 509, n. 119; *Plesioneura leucocera*, id., op. cit., 1882, p. 263; id., Wood-Mason and de Nicéville, Journ. A. S. B., vol. l, pt. 2, p. 257, n. 119 (1881); id., de Nicéville, op. cit., vol. lii, pt. 2, p. 100, (1883); id., Elwes and de Nicéville, op. cit., vol. lv, pt. 2, p. 441, n. 162 (1886); id., Hampson, op. cit., vol. lvii, pt. 2, p. 367, n. 260 (1888); id., Swinhoe, Proc. Zool. Soc. Lond., 1885, p. 146, n. 151; ? *P. leucocera*, Doherty, Journ. A. S. B., vol. lv, pt. 2, p. 139, n. 259 (1886); *Tagiades leucocera*, Plötz, Jahr. des Nass. Ver. Natur., vol. xxxvii, p. 51, n. 49 (1884); *Hesperia leucocerca*, Horsfield and Moore, Cat. Lep. Mus. E. I. C., vol. i, p. 252, n. 574 (1857); *Plesioneura leucocirca*, Elwes, Trans. Ent. Soc. Lond., 1888, p. 462, n. 529.

HABITAT: Himalayas (*Kollar* and *Westwood*); Lower Kunawur, N.-W. Himalayas (*Moore*); Andamans (*Wood-Mason* and *de Nicéville*); Sikkim (*de Nicéville*); Bombay (*Swinhoe*); Tavoy and Ponsekai (*Elwes* and *de Nicéville*); Sarju and Kali valleys, Kumaon, 2—5,000 feet (*Doherty*); Bhutan (*Horsfield* and *Moore*); Sikkim (*Elwes*); Nilgiri Hills, 2,000—5,000 feet, common (*Hampson*); Bengal (*Plötz*); Assam, Burma, Orissa, Travancore.

(22) CELÆNORRHINUS SIMULA, Hewitson.

Pterygospidea simula, Hewitson, Ann. and Mag. of Nat. Hist., fourth series, vol. xx, p. 321 (1877).

HABITAT: Sumatra (*Hewitson*).

(23) CELÆNORRHINUS MUNDA, Moore.

Plesioneura munda, Moore, Journ. A. S. B., vol. liii, pt. 2, p. 48 (1884).

HABITAT: Simla (*Moore*), Kulu, Kashmir.

Note—Mr. Elwes places this species with a query as a synonym of *C. leucocera*, Kollar, but I think it may be kept distinct; it is altogether a much paler insect, with fewer markings on the hindwing (none at all on the upperside) than in that species.

(24) CELÆNORRHINUS CHAMUNDA, Moore.

Plesioneura chamunda, Moore, Proc. Zool Soc. Lond., 1865, p. 788; id., de Nicéville, Journ. A. S. B., vol. lii, pt. 2, p. 100, n. 280 (1883); id., Elwes, Trans. Ent. Soc. Lond., 1888, p. 462, n. 530.

HABITAT: Bengal (*Moore*); Sikkim (*de Nicéville* and *Elwes*), Khasi Hills.

(25) CELÆNORRHINUS AMBAREESA, Moore.

Plesioneura ambareesa, Moore, Proc. Zool. Soc. Lond., 1865, p. 788; id., de Nicéville, Journ. A. S. B., vol. lii, pt. 2, p. 87, n. 33, pl. x, fig. 9, *female* (1883); id., Swinhoe, Proc. Zool. Soc. Lond., 1885, p. 146, n. 152; id., Hampson, Journ. A. S. B., vol. lvii, pt. 2, p. 367, n. 263 (1888); *Tagiades ambareesa*, Plötz, Jahr. des Nass. Ver. Natur., vol. xxxvii, p. 52, n. 52 (1884).

HABITAT: Maungbhoom in Bengal (*Moore*); Akrain in the Satpuras, Coonoor in the Nilgiri Hills (*de Nicéville*); Mahableshwur (*Swinhoe*); India (*Plötz*); Nilgiri Hills, 2,000—6,000 feet, not uncommon on the southern slopes, rare on the northern (*Hampson*); Khandalla, North Kanara, Trichinopoly, Rutnagherry.

(26) CELÆNORRHINUS SPILOTHYRUS, Felder.

Eudamus spilothyrus, Felder, Verh. zool.-bot. Gesellsch. Wien, vol. xviii, p. 283 (1868); *Plesioneura spilothyrus*, Moore, Lep. Cey., vol. i, p. 179, pl. lxvii, figs. 4, *male*; 4*a*, *female* (1881); vol. iii, p. 534, pl. ccxi, fig. 3, *larva* and *pupa* (1887); id., Hampson, Journ. A. S. B., vol. lvii, pt. 2, p. 367, n. 262 (1888).

HABITAT: Metopallium and Kunur in the Nilgiris (*Felder*); Ceylon (*Moore*); Nilgiri Hills, western slopes, September (*Hampson*).

(27) CELÆNORRHINUS FUSCA, Hampson.

Plesioneura fusca, Hampson, Journ. A. S. B., vol. lvii, pt. 2, p. 367, n. 261 (1888).

HABITAT: Nilgiris, 2,000 to 4,000 feet, not uncommon, and Shevaroy Hills (*Hampson*).

Note—This species differs from the preceding in having the cilia of the hindwing alternately brown and whitish, and from the following species in having the white macular discal band of the forewing broken up into spots instead of being continuous, and ending anteriorly in two small dots on the costa; in *C. nigricans* the band extends uninterruptedly to the costa.

(28) CELÆNORRHINUS NIGRICANS, de Nicéville.

Plesioneura nigricans, de Nicéville, Journ. A. S. B., vol. liv, pt. 2, p. 123, pl. ii, fig. 6, *female* (1885); id., Elwes and de Nicéville, op. cit., vol. lv, pt. 2, p. 441, n. 161 (1886); id., Elwes, Trans. Ent. Soc. Lond., 1888, p. 461, n. 527.

HABITAT: Sikkim, Buxa (*de Nicéville*); Tavoy (*Elwes* and *de Nicéville*); Sikkim (*Elwes*); Khasi Hills.

(29) CELÆNORRHINUS TIBETANA, Mabille.

Pterygospidea tibetana, Mabille, Ann. Soc. Ent. France, fifth series, vol. vi, p. liv, n. 24 (1876).

HABITAT: Thibet (*Mabille*).

(30) CELÆNORRHINUS DAVIDII, Mabille.

Pterygospidea davidii, Mabille, Ann. Soc. Ent. France, fifth series, vol. vi, p. liv, n. 25 (1876).

HABITAT: Moupin, Thibet (*Mabille*).

(31) CELÆNORRHINUS AGNI, de Nicéville.

Plesioneura agni, de Nicéville, Journ. A. S. B., vol. lii, pt. 2, p. 87, n. 32, pl. x, fig. 4, *female* (1883); id., Elwes, Trans. Ent. Soc. Lond., 1888, p. 462, n. 531.

HABITAT: Sikkim (*de Nicéville* and *Elwes*).

(32) CELÆNORRHINUS LAXMI, de Nicéville.

Plesioneura laxmi, de Nicéville, Journ. A. S. B., vol. lvii, pt. 2, p. 290, n. 21, pl. xiii, fig. 5, *male* (1888).

HABITAT: Burma (*de Nicéville*).

21. (33) CELÆNORRHINUS BUCHANANII, n. sp., Pl. B, Fig. 2, ♀.

HABITAT: Upper Burma.

EXPANSE: ♀, 2·1 inches.

DESCRIPTION: FEMALE. Very closely allied to *C. laxmi*, mihi, from which it differs in its considerably larger size. UPPERSIDE, *forewing* with the white discal band fully twice as wide, not divided into spots, extending uninterruptedly from the costa to the submedian nervure, its edges very irregular, its lower portion posterior to the first median nervule much narrower than the rest of the band; it lacks the two small obliquely-placed black dots found towards the base of the submedian interspace in *C. laxmi*. *Hindwing* instead of possessing two parallel discal macular black bands has a rounded black spot towards the end of the discoidal cell, and a discal series of six black spots, of which the anterior one is round and well-separated from the spot which follows it, the second spot is round, the next pair are the largest and elongated, and the last pair smaller but also elongated; *cilia* of hindwing anteriorly white posteriorly dark brown. UNDERSIDE, *both wings* with the same differences as above, but all the spots of the *hindwing* more prominent.

I believe this to be a species distinct from *C. laxmi*, though a single male of the latter only is known, and the former is described from a single female. The difference in size is very considerable, and is greater than is usually found in the opposite sexes of the *Hesperiidæ*, and the markings also shew marked differences. I have named it after its capturer, Mr. A. M. Buchanan, who obtained it in the Ruby Mine district, Upper Burma.

(34) CELÆNORRHINUS GOTO, Mabille.

Plesioneura goto, Mabille, Ann Soc. Ent. Belg., vol. xxvii, p. lvi (1883).

HABITAT: Japan (*Mabille*).

(35) CELÆNORRHINUS TABRICA, Hewitson.

Pterygospidea tabrica, Hewitson, Ex. Butt., vol. v, pl. *Pterygospidea*, fig. 8 (1873), *Tagiades tabrica*, Plötz, Jahr. des Nass. Ver. Natur., vol. xxxvii, p. 53, n. 58 (1884).

HABITAT: Darjiling (*Hewitson* and *Plötz*).

(36) CELÆNORRHINUS PINWILLI, Butler.

Plesioneura pinwilli, Butler, Trans. Linn. Soc. Lond., Zoology, second series, vol. i, p. 556, n. 5, pl. lxviii, fig. 4, *male* (1877); id., Distant, Rhop. Malay., p. 400, n. 3, pl. xxxv, fig. 29, *male* (1886); *Gehlota pinwilli*, Doherty, Journ. A. S. B., vol. lviii, pt. 2, p. 131 (1889).

HABITAT: Malacca (*Butler* and *Distant*); Margherita, Assam (*Doherty*).

Genus NOTOCRYPTA, nov.

Plesioneura, Felder, Wien. Ent. Monatschr., vol. vi, p. 29 (1862), preoc.; *Plesioneura,* part, auctorum.

Differs from *Celænorrhinus,* Hübner, in the FOREWING being more triangular, the *middle disco-cellular* nervule being distinctly longer instead of shorter than the lower disco-cellular, concave instead of almost straight, the middle and lower disco-cellular nervules taken together less strongly inwardly oblique; the HINDWING is also shorter and more produced posteriorly, the *costa* is more arched, the *discoidal cell* is distinctly shorter, thus causing all the veins which spring from it (the first and second subcostal, the discoidal, and the three median nervules) to be distinctly longer. There is a marked difference in the length of the haustellum or tongue, which in *C. leucocera,* Kollar, measures 1·8 inches, in *N. alysos,* Moore, only ·9 of an inch, or exactly half. Type, the *Plesioneura curvifascia* of Felder.

This diagnosis has been drawn up from bleached wings of both sexes of *N. alysos,* Moore; from Sikkim. All the species of this genus settle with closed wings; through an unfortunate and stupid mistake I once stated that they rest with wide outspread wings. This marked characteristic in life, which at once distinguishes *Notocrypta* from *Celænorrhinus,* has led me to discriminate these two genera; there is also considerable difference in the outline of the wings, and I believe *Notocrypta* never has the hindwing spotted, except in *N. paralysos,* W.-M. and de N., this being always a feature in *Celænorrhinus.* The type species, *N. curvifascia,* was described from China, and has been identified by Messrs. Plötz, Doherty and Leech as synonymous with *N. alysos,* Moore, but an actual comparison of specimens is desirable. The transformations of *N. alysos,* Moore, only are known.

(1) NOTOCRYPTA CURVIFASCIA, Felder.

Plesioneura curvifascia, Felder, Wien. Ent. Monatsch., vol. vi, p. 29, n. 29 (1862); id., Elwes, Proc. Zool. Soc. Lond., 1881, p. 910; id., Plötz, Berl. Ent. Zeits., vol. xxvi, p. 263, n. 5 (1882); id., Doherty, Journ. A. S. B., vol. lv, pt. 2, p. 139, n. 260 (1886); id., Leech, Proc. Zool. Soc. Lond., 1887, p. 427, n. 133.

HABITAT: Ning-po, China (*Felder* and *Elwes*); China, India (*Plötz*); Bagheswar, 3,500 feet, Kumaon (*Doherty*); Japan (*Leech*).

Note—Messrs. Plötz, Doherty and Leech identify the following species with this.

(2) NOTOCRYPTA ALYSOS, Moore.

Plesioneura alysos, Moore, Proc. Zool. Soc. Lond., 1865, p. 789; idem, id., op. cit., 1877, p. 593; idem, id., Lep. Cey., vol. i, p. 178, pl. lxvii, figs. 3, *male*; 3*a*, *female*; 3*b*, *larva* and *pupa* (1881); idem, id., Proc. Zool. Soc. Lond., 1882, p. 263; idem, id., Journ. Linn. Soc. Lond., Zoology, vol. xxi, p. 54 (1886); id., Butler, Trans. Linn. Soc. Lond., Zoology, second series, vol. i, p. 556, n. 2 (1877); id., Wood-Mason and de Nicéville, Journ. A. S. B., vol. xlix, pt. 2, p. 241, n. 80 (1880); idem, id., op. cit., vol. l, pt. 2, p. 256, n. 116 (1881); idem, id, op. cit., vol. lv, pt. 2, p. 390, n. 243 (1886); id., de Nicéville, Journ. A. S. B., vol. l, pt. 2, p. 60, n. 128 (1881); id., Elwes and de Nicéville, Journ. A. S. B., vol. lv, pt. 2, p. 440, n. 160 (1886); id., Elwes, Trans. Ent. Soc. Lond., 1888, p. 461, n. 525; id., Mabille, Ann. Soc. Ent. Belg., vol. xxi, p. 33, n. 98 (1878); id., Distant, Rhop. Malay., p. 399, n. 1, pl. xxxiv, fig. 7, *male* (1886); id., Hampson, Journ. A. S. B., vol. lvii, pt. 2, p. 368, n. 264 (1888); *Hesperia alysos*, Horsfield and Moore, MS., Cat. Lep. Mus. E. I. C., vol. i, p. 253, n. 577 (1857).

HABITAT: Bengal, Andamans, Ceylon, N.-W. Himalyas, Mergui (*Moore*); Moulmein, Ceylon, Penang, Malacca, Borneo, Java (*Butler*); Andamans, Cachar (*Wood-Mason* and *de Nicéville*); Sikkim (*de Nicéville*); Tavoy and Ponsekai (*Elwes* and *de Nicéville*); Sikkim, Kangra, Andamans, Philippines, Foochow (*Elwes*); Java (*Mabille*); Penang, Province Wellesley, Sungei Ujong, Singapore (*Distant*); Nilgiri Hills, 3,600 feet, northern slopes, rare (*Hampson*); Java (*Horsfield* and *Moore*); Himalayas, Assam, Burma, Orissa, Ganjam, Wynaad, Travancore.

(3) NOTOCRYPTA PARALYSOS, Wood-Mason and de Nicéville.

Plesioneura paralysos, Wood-Mason and de Nicéville, Proc. A. S. B., 1881, p. 143, n. 15; idem, id., Journ. A. S. B., vol. l, pt. 2, p. 257, n. 117 (1881).

HABITAT: South Andaman Isles (*Wood-Mason* and *de Nicéville*).

Note—Mr. Elwes (Trans. Ent. Soc. Lond., 1888, p. 461, n. 525) identifies this species with the preceding, but it appears to constantly differ from *N. alysos* in possessing a varying number of white opaque lustrous spots on the underside of the hindwing in both sexes.

(4) NOTOCRYPTA RESTRICTA, Moore.

Plesioneura restricta, Moore, Lep. Cey., vol. i, p. 178 (1881); id., Wood-Mason and de Nicéville, Journ. A. S. B., vol. lv, pt. 2, p. 390, n. 244, pl. xvii, fig. 5, *male* (1887); id., de Nicéville, op. cit., vol. lii, pt. 2, p. 100, n. 278 (1883); id., Elwes, Trans. Ent. Soc. Lond., 1888, p. 461, n. 526; id., Hampson, Journ. A. S. B., vol. lvii, pt. 2, p. 368, n. 265 (1888).

Habitat : Ceylon (*Moore*) ; Cachar (*Wood-Mason* and *de Nicéville*) ; Sikkim (*de Nicéville*) ; Sikkim, Andamans, Burma (*Elwes*) ; Nilgiri Hills, 2,000—4,000 feet, rare (*Hampson*) ; Bhutan, Assam, Orissa.

(5) NOTOCRYPTA ASMARA, Butler.

Plesioneura asmara, Butler, Trans. Linn. Soc. Lond., Zoology, second series. vol. i, p. 556, n. 3 (1877) ; id., Distant, Rhop. Malay., p. 400, n. 2, pl. xxxv, fig. 28 (188) ; *Hesperia asmara*, Horsfield and Moore, M.S., Cat. Lep. Mus. E. I. C., vol. i, p. 253, n. 576 (1857).

Habitat : Moulmein, Malacca, Java (*Butler*) ; Malacca (*Distant*) ; Java (*Horsfield* and *Moore*).

Note—As figured by Mr. Distant, this species has a large quadrate spot at the end of the cell of the forewing, a long narrow one below at the base of the second median interspace, and a third large quadrate spot below the last near the middle of the second median interspace ; three subapical conjoined dots. A good description of this species is much wanted.

(6) NOTOCRYPTA RUFICORNIS, Mabille.

Plesioneura ruficornis, Mabille, Ann. Soc. Ent. Belg., vol. xxi, p 32, n. 93 (1878).

Habitat : Java (*Mabille*).

(7). NOTOCRYPTA INSULATA, Butler.

Plesioneura insulata, Butler, Ann. and Mag. of Nat. Hist., fifth series, vol. x, p. 154, n. 31 (1882) ; idem, id., op. cit., vol. xi, p. 424, n. 88 (1883).

Habitat : New Britain, Aru (*Butler*).

(8) NOTOCRYPTA PROSERPINA, Butler.

Plesioneura proserpina, Butler, Ann. and Mag. of Nat. Hist., fifth series, vol. xi, p. 424, n. 89 (1883).

Habitat : Aru (*Butler*).

(9) NOTOCRYPTA ALBIFASCIA, Moore.

Plesioneura albifascia, Moore, Proc. Zool. Soc. Lond., 1878, p. 843, pl. liii, fig. 3, *male*.

Habitat : Hatsiega, Burma, ? Sumatra (*Moore*) ; Moulmein.

(10) NOTOCRYPTA MONTEITHI, Wood-Mason and de Nicéville.

Plesioneura monteithi, Wood-Mason and de Nicéville, Journ. A. S. B., vol. lv, pt. 2, p. 391, n. 245, pl. xviii, figs. 3, 3*a*, *female* (1886).

Habitat : Cachar (*Wood-Mason* and *de Nicéville*).

Note—This species is very near to the preceding, but has the white discal band of the forewing typically quite twice as broad, and with an additional spot at the base of the second median interspace. On the underside of the forewing of *N. albifascia* the white band stops short at the subcostal nervure, in *N. monteithi* it extends right up to the costa. These characters may however be sexual, as the male of *N. albifascia* and the female of *N. monteithi* only are known.

(11) NOTOCRYPTA VOLUX, Mabille.

Plesioneura volux, Mabille, Ann. Soc. Ent. Belg., vol. xxvii, p. lvi (1883).

HABITAT: Philippines (*Mabille*).

(12) NOTOCRYPTA MICROTHYRUS, Mabille.

Plesioneura microthyrus, Mabille, Ann. Soc. Ent. Belg., vol. xxvii, p. lvii, (1883).

HABITAT: Philippines (*Mabille*).

(13) NOTOCRYPTA PRIA, Druce.

Plesioneura pria, Druce, Proc. Zool. Soc. Lond., 1873, p. 359, n. 2.

HABITAT: Borneo (*Druce*).

Note—The description of this species is so inadequate in the absence of a figure that I cannot be sure that it even belongs to this genus.

(14) NOTOCRYPTA SIGNATA, Druce.

Plesioneura signata, Druce, Proc. Zool. Soc. Lond., 1873, p. 360, n. 3, pl. xxxlii, fig. 8.

HABITAT: Borneo (*Druce*).

(15) NOTOCRYPTA TOLA, Hewitson.

Plesioneura tola, Hewitson, Ann. and Mag. of Nat. Hist., fifth series, vol. i, p. 340 (1878).

HABITAT: Tondano (*Hewitson*).

(16) NOTOCRYPTA CYTHNA, Hewitson.

Plesioneura cythna, Hewitson, Ann. and Mag. of Nat. Hist., fifth series, vol. i, p. 341 (1878).

HABITAT: Not given.

(17) NOTOCRYPTA FEISTHAMELII, Boisduval.

Thymele feisthamelii, Boisduval, Voy. Astrolabe, Ent., p. 159, Lepidoptères, pl. iii, fig. 6 (1832); *Hesperia feisthamelii*, Blanchard, Voy. Pole Sud, Zoologie, vol. iv, p. 403, Lépidoptères, pl. iii, figs. 19, 20 (1853); *Plesioneura feisthamelii*, Druce, Proc. Zool. Soc. Lond., 1873, p. 359, n. 1; *P. feisthameli*, Plötz, Berl. Ent. Zeitsch., vol. xxvi, p. 262, n. 2 (1882).

HABITAT: Moluccas (*Boisduval* and *Blanchard*); Borneo (*Druce*); Philippines, Moluccas (*Plötz*).

(18) NOTOCRYPTA RENARDI, Oberthür.

Plesioneura renardi (Boisduval, MS.), Oberthür, Ann. del Mus. Civ. di St. Nat. di Genova, vol. xii, p. 467, n. 58 (1878); idem, id., op. cit., vol. xv, p. 528, n. 226 (1880).

HABITAT: Dorey in New Guinea (*Oberthür*).

(19) NOTOCRYPTA FLAVIPES, Janson.

Plesioneura flavipes, Janson, Cruise of the Marchesa, vol. ii, p. 377, n. 93 (1886).

HABITAT: New Guinea (*Janson*).

Note—This species is said to be allied to the two preceding, but is larger, the forewing is more acute at the apex, where there are no white spots.

(20) NOTOCRYPTA LEUCOGRAPHA, Plötz.

Plesioneura leucographa, Plötz, *Hesp.*, t. 235 (18); idem, id., Berl. Ent. Zeitsch. vol. xxvi, p. 262, n. 1 (1882).

HABITAT: India (*Plötz*).

Note—This species is quite unknown to me.

(21) NOTOCRYPTA VARIANS, Maassen.

Plesioneura varians, Maassen, pict. 1, pl. xxxix, fig. 11 (18); id., Plötz, *Hesp*, t. 237 (18); idem, id., Berl. Ent. Zeitsch., vol. xxvi, p. 262, n. 3 (1882).

HABITAT: South Asia (*Plötz*).

(22) NOTOCRYPTA CHIMÆRA, Keferstein.

Plesioneura chimæra, Keferstein, vol. i, p. 1 (18); id., Plötz, *Hesp.*, t. 238 (18); idem, id., Berl. Ent. Zeitsch., vol. xxvi, p. 262, n. 4 (1882); id., Pagenstecker, J. B. Nass Ver., vol. xxxvii, p. 208, pl. vi, fig 1 (18).

HABITAT: India (*Plötz*).

Note—This species also is unknown to me.

(23) NOTOCRYPTA WAIGENSIS, Plötz.

Plesioneura waigensis, Plötz, *Hesp.*, t. 240 (18); id., Berl. Ent. Zeitsch., vol. xxvi, p. 263, n. 6 (1882); id., Ribbe, Iris, vol. i, p. 86, n. 147 (1886).

HABITAT: Waigou (*Plötz*); Aru (*Ribbe*).

(24) NOTOCRYPTA QUEDA, Plötz.

Plesioneura queda, Plötz, Berl. Ent. Zeitschr., vol. xxix, p. 225, n. 2 (1885); idem, id., Stett. Ent. Zeitsch., 1886, p. 87, n. 1*a*.

HABITAT: Malacca (*Plötz*).

(25) NOTOCRYPTA ZAWI, Plötz.

Plesioneura zawi, Plötz, Berl. Ent. Zeitsch., vol. xxix, p. 225, n. 3 (1885); idem, id., Stett. Ent. Zeitsch., 1886, p. 87, n. 1*b*.

HABITAT: Celebes (*Plötz*).

(26) NOTOCRYPTA WOKANA, Plötz.

Plesioneura wokana, Plötz, Berl. Ent. Zeitsch., vol. xxix, p. 225, n. 4 (1885); idem, id., Stett. Ent. Zeitsch., 1886, p. 87, n. 6*b*; id., Ribbe, Iris, vol. i, p. 86, n. 146 (1886).

HABITAT: Aru (*Plötz* and *Ribbe*).

(27) NOTOCRYPTA BASIFLAVA, de Nicéville.

Plesioneura basiflava, de Nicéville, Journ. A. S. B., vol. lvii, pt. 2, p. 290, n. 22, pl. xiii, fig. 7, *male* (1888); id., Hampson, op. cit., p. 368, n. 266.

HABITAT: Nilgiri Hills, Travancore (*de Nicéville*); western slopes Nilgiri Hills, 2,000—3,000 feet, September (*Hampson*).

(28) NOTOCRYPTA BADIA, Hewitson.

Pterygospidea badia, Hewitson, Ann. and Mag. of Nat. Hist., fourth series, vol. xx, p. 322 (1877); idem, id., Desc. Lep. coll. Atk., p. 4 (1879); *Plesioneura badia*, de Nicéville, Journ. A. S. B., vol. lii, pt. 2, p. 88, n. 34, pl. x, fig. 10, *male* (1883); id., Elwes, Trans. Ent. Soc. Lond., 1888, p. 462, n. 528 (1888).

HABITAT: Sikkim (*Hewitson, de Nicéville* and *Elwes*).

(29) NOTOCRYPTA CÆNIRA, Hewitson.

Hesperia cænira, Hewitson, Ex. Butt., vol. iv, *Hesperia* pl. ii, figs. 15, 16, *male* (1867); id., Plötz, *Hesp.*, t. 241 (18); idem, id., Berl. Ent. Zeitsch., vol. xxvi, p. 263, n. 7 (1882).

HABITAT: Old Calabar (*Hewitson*); West Africa (*Plötz*).

Note—This species is very abnormally marked, the hindwing bearing a broad medial transverse band of lilac-white on the underside.

(30) NOTOCRYPTA CRONA, Hewitson.

Plesioneura crona, Hewitson, Ann. and Mag. of Nat. Hist., fifth series, vol. i, p. 341 (1878).

HABITAT: Batchian (*Hewitson*).

Note—The forewing is said to be crossed by a semi-transparent increasing regular band of orange.

Messrs. Elwes, Butler and Leech give the *Eudamus bifasciatus* of Bremer and Grey as a *Plesioneura*; the late Herr Carl Plötz in 1882 placed it in the genus *Proteides*, Hübner. I have not seen it, but to judge from the figure by Ménétriés it appears to belong to Moore's genus *Lobocla,* and allied to the Indian species *liliana* and *casyapa* of Moore. It occurs in China, Japan, and N.-W. Corea.

I am aware that this revision of the genus *Plesioneura* of authors is very imperfect and incomplete, but I hope it may be of some use to systematic entomologists. I possess and have access to none but Indian species, and many of the books in which the original descriptions appeared—especially those by Plötz—are not available, In some cases it is probable that I have placed the species in the wrong genus, or they may not even belong to *Celænorrhinus* or *Notocrypta* at all.

EXPLANATION OF THE PLATES.

Plate A.

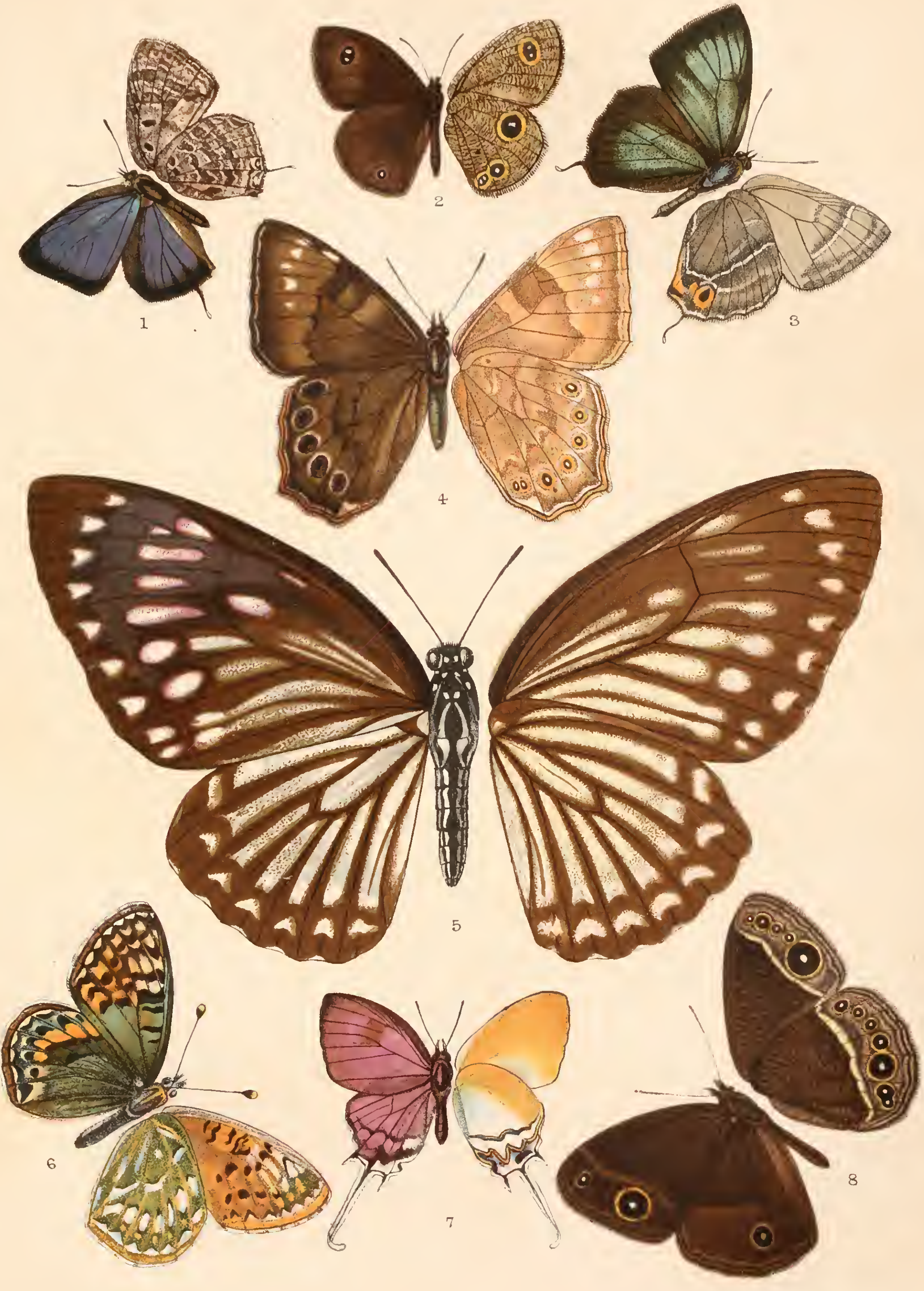
Fig. 1. *Arhopala aida,* n. sp., ♂, p. 168.
,, 2. *Ypthima lycus,* n. sp., ♂, p. 165.
,, 3. *Zephyrus zoa,* n. sp., ♂, p. 167.
,, 4. *Lethe tristigmata,* Elwes, ♀, p. 163.
,, 5. *Papilio (Euplœopsis) telearchus,* Hewitson, ♀, p. 169.
,, 6. *Argynnis clara,* Blanchard, ♀, p. 165.
,, 7. *Biduanda cinesoides,* n. sp., ♂, p. 166.
,, 8. *Mycalesis (Samanta) misenus,* n. sp., ♂, p. 164.

Plate B.

Fig. 1. *Hasora anura,* n. sp., ♀, p. 170.
,, 2. *Celænorrhinus buchananii,* n. sp., ♀, p. 186.
,, 3. *Parnara pholus,* n. sp., ♀, p. 172.
,, 4. *Celænorrhinus patula,* n. sp., ♀, p. 182.
,, 5. *Hasora anura,* n. sp., ♂, p. 170.
,, 6. *Parnara sarala,* n. sp., ♀, p. 173.
,, 7. *Chapra mathias,* Fabricius, ♂, p. 176.
,, 8. *Halpe aina,* n. sp., ♂, p. 176.
,, 9. *Hesperia hellas,* n. sp., ♂, p. 177.
,, 10. *Parnara parca,* n. sp., ♀, p. 174.
,, 11. *Celænorrhinus pyrrha,* n. sp., ♀, p. 181.
,, 12. ,, *pero,* n. sp., ♂, p. 183.
,, 13. ,, *plagifera,* n. sp., ♀, p. 182.

L. De NICÉVILLE, Journ. Bomb. Nat. Hist. Soc. 1889, Vol IV.

Pl A.



B. L. Dos del.

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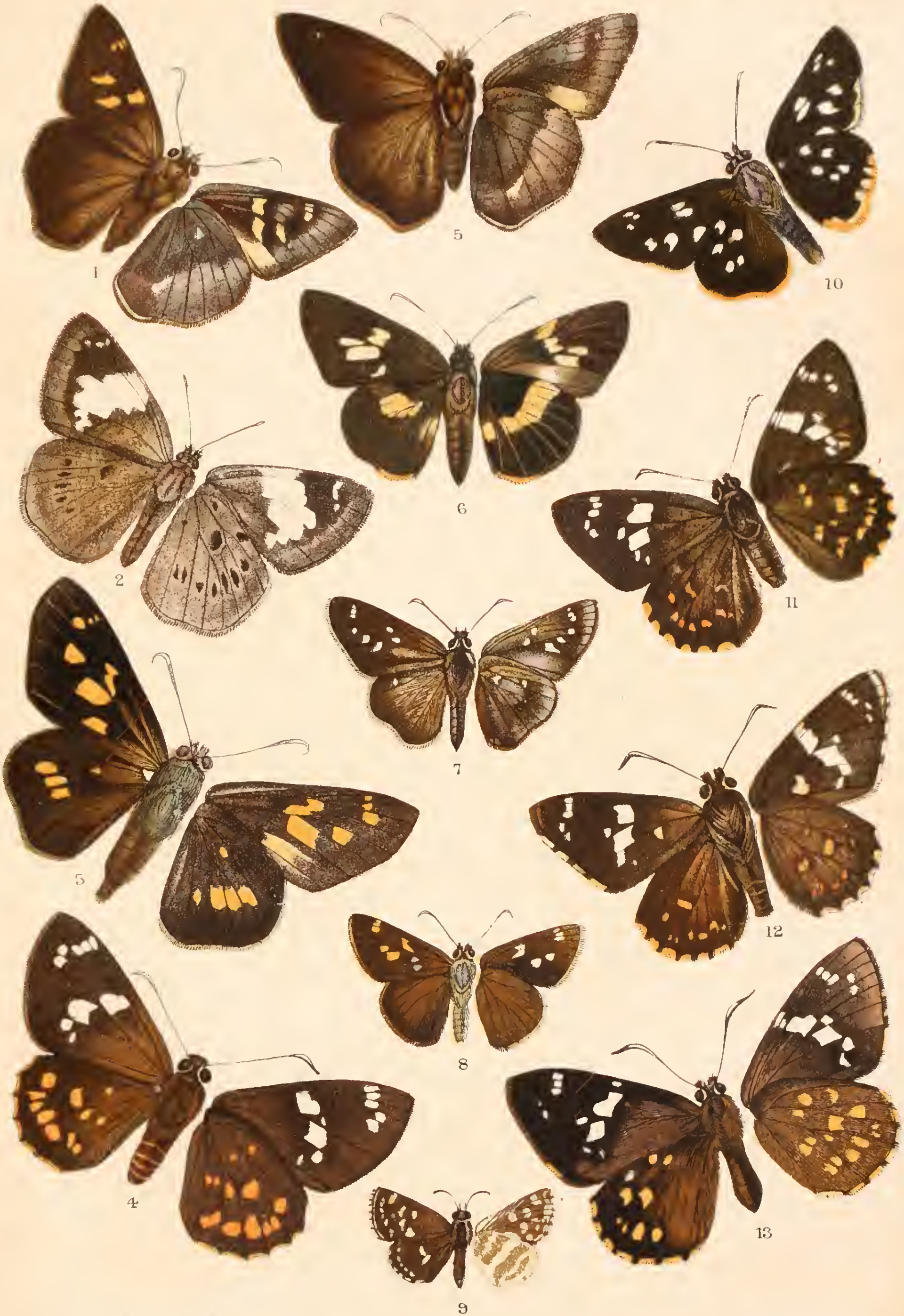
INDIAN BUTTERFLIES

L. De NICÉVILLE, Journ. Bomb. Nat. Hist. Soc., 1889. Vol. IV

Pl. B.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INDIAN BUTTERFLIES.

NOTES ON MAN-EATING TIGERS.

By Reginald Gilbert, Bombay.

(*Read at the Society's Meeting on 4th September* 1889.)

I have selected this title, not because I have had particular experience on the subject, or because I am an expert, but because I wish to place on the records of our Society a few facts relating to man-eaters which can be considered as reliable, several of them being cases of man-eaters killed by my friend, Mr. W. B. Mulock, Bombay Civil Service, of our Society, now at home on furlough, and who has most successfully devoted a great deal of his time to the destruction of man-eaters; another being the case which is known as the Nagpore man-eater, another the "Jaunsar" man-eater, well known in the N.-W. Provinces, and lastly, the case of an alleged man-eater, which I killed this year in Bansda. You must not expect me to give you any thrilling account of some personal adventure where I risked my life to rid the district of a brute long the terror of the inhabitants, because I may say at once that the only man-eater I have killed, exposed me to no more danger than I should incur in any ordinary day's shooting after small game. Indeed, it would scarcely be in accordance with the object of our Society to read a paper relating to personal adventure of this kind. I only wish to touch on various points which I think may chiefly be of interest to our members from a Natural History point of view, and in the hope that other members may be able to supply us with information on this very interesting subject which they can personally vouch as correct.

Now the general impression prevailing about man-eaters is, that the man-eater is an old brute, more often decrepit than otherwise, perhaps lamed from some former wound, with his teeth broken and his skin always mangy, unable from his infirmities to kill game, his natural food, but obliged to conceal himself near a village path and then to pounce on some solitary human being and devour him, never attacking when there are more than two or three human beings together and always displaying very great cunning, so that his destruction becomes almost impossible. It is difficult to read books of Indian sport without coming to that conclusion. No reliance, however, can be placed, I fear, on books of sport, with one or two bright exceptions, one of which is Mr. Saunderson's book. Books of sport are written to be read by the masses, and the first idea of the author is to romance and to write something of an exciting kind to please his readers, and not a strictly accurate account of what the author has himself witnessed or known. These books of sport have therefore little value from a Natural History point of view. I only mention this, because my own opinion is that the general impression about man-eaters is altogether wrong, except as to his display of cunning. I am aware that one swallow does not make a summer, and that many of my hearers may rightly think my opinion on this subject is of little value. Man-eaters are happily so few and far between that the most experienced shikary can in a lifetime only come across a very few. I start then by saying that I believe man-eaters are not different in any way from the ordinary game or bullock-eating tiger, and that age, deformity, injury or otherwise, have nothing whatever to do with the question. Why a tiger turns man-eater I can offer no opinion, and why a tiger never kills a goat, but nevertheless kills such small fry as peacocks, porcupine, or monkeys I also cannot reply to. The universal fear that all animals have to man is no doubt the reason why the tiger seldom happily does turn man-eater. There are some large districts in India infested with tigers where a man-eater is never heard of, whilst there are other smaller districts, one of which I intend hereafter to refer to, where man-eaters are constantly appearing. I wrote to a friend of mine, a Forest Officer in the Berars, who is a very successful and keen tiger-slayer, and who, I thought, could give me some very important information. He however tells me that he has not known a single case of a man-eating tiger, although however he has known of a man-eating panther in his districts in the Berars.

The first man-eater I wish to introduce you to is the tiger we have often read of in our local newspapers as the Nagpore man-eater. As regards this one, I have obtained my information from Messrs. George Anderson and George Moule, Engineers on the Bengal-Nagpur Railway, who have been out on several occasions after the beast, and have reliable means of obtaining accurate information. This man-eater is a tigress, and has the following peculiarities of character, *viz.*, her love of feasting on the employés of the Bengal-Nagpur Railway, of frequenting only a small tract of country, about nine square miles in area, and her great cunning and audacity. She has been killing for three successive years; as far as my informants know, she has killed from twenty-eight to thirty-eight human beings, but these must be taken as much less than the correct actual number, because my informants only return what the railway officials hear of and confirm, and these returns are mostly of people connected with the railway. In 1889, up to June, she has killed seven people besides wounding others. The district she works in is as I have said about nine square miles only, and is near the Darekasa Railway Station. She appears to live in a rocky and precipitous spur, through which a tunnel has been cut. This spur carries heavy bamboo and other jungle. Several springs of water rise from out of the spur. In many places at the foot of the scarps there are delightfully cool places for her to lie up in, where the ground is always moist. There is also a cave in a detached mass of the spur, which shows many signs of being used by the tigress and the family. A big stone just outside the entrance is scored deep and long with many scratches of their claws. The jungle around the cave is very thick, and the cave is very awkward to get at. "The whole area hunted by the tigress," writes Mr. Anderson, "is hard to determine, but for weeks together it is believed she has hunted within this area of nine square miles or even less." A great number of sportsmen (in fact too many) have been after her without success. She will not return to a kill; if she cannot carry off a carcase to a safe place, she will abandon it altogether. About the middle of January last she began to frequent the railway, being seen at all hours in broad daylight. On 24th February 1889, at 2-20 p.m., she jumped from the top of the slope of a cutting about twelve feet on to the line, where a gang of permanent-way men was at work, snatched up one of them and vanished up the opposite slope in a second. She carried the body to a pool of water about 300 yards off and there ate it. On the 25th February a beat was organised, and three tigers were found at home, in the cave, of which two were shot by Mr. Cleveland and Captain Silver, Adjutant of the B.-N. Railway Volunteers, both of which tigers were young ones, not fully grown, the cubs of the old sinner. On the 29th February, she killed a boy near the same place and carried his body a long way. Mr. Anderson has seen the pugs of a young cub with her, apparently one of her last litter. The cubs that were killed are probably of another former litter. On the 4th March, the tigress attacked a woodcutter near the railway, but was driven off pluckily by his companion, who attacked her with an axe. All April she appears to have kept to the same ground, and in the middle of May she killed another man near the railway. It appears there have been previous man-eaters in this neighbourhood, so that this tigress may have been educated in this vice by a wicked ancestor or companion of hers. In the year 1883, this particular spur was infested with tigers, and seems to have long been a regular house of call for tigers. In May last Mr. Moule, whilst seated on a *machán* at night, had a shot at this tigress, but he was unable to see her properly, and she got off scatheless. It is hoped she will be bagged before long.

I will next take you to the neighbourhood of Sardardevi, Bansda State, where the Dangs Baroda territory and Bansda territory lie contiguous. Near here a tigress in 1884 and 1885 killed a very large number of people, and in 1888 and 1889, in the same neighbourhood, another man-eater sprang up, which became the terror of that district, and killed a large number of people. Mr. Mulock killed the former in May 1885, and I killed that which is supposed to be the latter on 2nd April 1889, so that after an interval of only four years the inhabitants of this district were so unfortunate as to have a second man-eater spring up to take the place of the first. Mr. Mulock has written a very graphic account of how he killed this tigress and two three-quarter grown cubs with her, which he printed, and a copy is in our library. This district is hilly, well watered, and covered with jungle. There is scarcely any cultivation, but villages inhabited by various jungle tribes are scattered about here and there. There are plenty of chetul, sambhur, pig, &c., about, and also plenty of cattle grazing in the jungle, so that the man-eater has little excuse for taking to his evil ways. Mr. Mulock mortally wounded this tigress on the 4th May 1885, and it was only on the 13th May that he actually got it. It was wounded in the jaw, and was unable to eat from the 4th to 13th May. Maggots got into the wound, so that when she was killed "she was exceedingly finely drawn from hunger and emaciation." Mr. Mulock describes her as having a beautifully marked skin. This is apparent from a photograph I have of her in my book. There is no appearance of mange in her skin, nor does Mr. Mulock describe her as appearing injured, so as to prevent her from finding her food in a legitimate feline manner. Mr. Mulock found the same difficulty as I did in getting exact information of the number of people killed, but the evidence he collected showed that a large number of people were eaten by this tigress, and there can be no doubt, as he says, this was the culprit, as, writing six months afterwards, he states not a single person had been killed by tigers, and so far as I can discover not till 1888 did another human being fall a prey to a tiger in this district.

I received an invitation from Mr. A. W. Crawley-Boevey, who was then Collector of Surat, to shoot with him in April 1889 in the Native State of Bansda. I was informed of the ravages of a man-eater in these same Sardardevi jungles, and Mr. Boevey suggested we should go after it if the *kubber* was reliable. I arrived at Bansda on 30th March, when Mr. Boevey at once informed me that the tiger had killed a woman near Sardardevi during the Holi holidays, about fifteen days back, and we agreed it would be well to go over there some ten miles distant, and spend a few days after the man-eater or some bears said to be in that neighbourhood. The Rajah of Bansda showed us every kindness and facility, had a camp pitched for us at Sardardevi, and placed a number of sowars, sepoys, shikaris, &c., at our disposal. He is an enlightened Rajah, but not so enlightened as is the English ruler of a neighbouring province, who with one hand doles out a reward to those who kill a tiger, whilst with the other he from time to time pens rules placing needlessly heavy restrictions on those who spend time and money in killing tigers in his province! No rules or restrictions were placed in our way and no permit was required, but a hearty welcome was given us by the Rajah and his Dewan, Mr. Jhaverbhai Nathabai. Whilst riding out to Sardardevi in the early morning, a sowar met us bearing a message from the shikari Hubib, who had for years been Mr. Mulock's shikari, telling us that the man-eater had killed three bullocks belonging to some Brinjarees on the previous afternoon and two bullocks the day before. We hurried on to Sardardevi, where we met Jemadar Abdulla, head of the Dharampore State Police, and a noted shikari who had come to assist us. He informed us that there were two tigers, one they had marked down, the smaller one having eaten and gone off some distance. We found the beaters ready, and at once went off to the jungle, where we found everything ready, passing on the road the Brinjari camp from whence came the bullocks which had been killed. Mr. Boevey was placed up a tree near one of the kills which had not been eaten at all. Soon after the beat commenced, the tiger roared. The beat came on almost up to us when the tiger broke back with a roar through the beaters without damaging any one of them. In fact, Hubib told me he turned out of the way of a beater standing on his direct path, instead of knocking him down and giving him a pat, as often does occur when an unwounded tiger breaks back. I attributed his breaking back to his being driven over his kill. I have noticed tigers always break back when an attempt is made to drive them over the kill. I should like to know if the experience of others is the same. The second time the beat commenced in the same way, and the tiger was driven into some high grass near Mr. Boevey's tree. He came out with a bound under Mr. Boevey's "mahla." Mr. Boevey saw that he was going straight towards my tree in an open space, and generously sacrificed his shot so as to enable me to get an easy one. I killed him without any trouble, and I have here some photos. of him taken where he fell. He was not a large tiger, nor a mangy one, nor did he appear to be different in any way to an ordinary tiger. He was nine feet long. All the beaters, shikaries, &c., declared that he was the identical man-eater, but could bring me no other evidence than their oft-repeated assertion and the fact that many people had been killed lately in the jungles in the neighbourhood. There was still the tigress to be accounted for; which had been pugged to a distant jungle that morning, and this tigress probably was a man-eater too. In the night I heard the tigress roar several times within a mile from my tent. The next morning and the morning after that we found her pugs at the water where she had drunk close to our camp. These were carried into some likely jungle which we beat on both days without seeing anything of her. On the third day she drank at the same water, passed close to our camp along the same path, and the shikaries declared her to be lying down on the side of a hill. No one had seen her, but they pointed out some vultures sitting in a tree up the hill, and said that she had killed a pig or a chetul, and they stated most positively she was lying down in a certain spot pointed out to us. In this they were correct. She had killed a pig, and she was lying down in the place indicated. It is difficult to account for the certainty and accuracy of these jungle men in placing the exact whereabouts of a tiger which no one has seen. How we ought to proceed was a question of woodcraft, and our Bheels held a council of war. After considerable discussion they took us up hill, saying they would beat up hill to the guns, but after taking us part of the way they concluded it was too hot for her to go up the hill and it would be better to drive her through some shady jungle at the bottom. We offered no opinion, but simply left it to them to decide. Our knowledge of woodcraft was as nothing compared to theirs. This tigress also roared when the beat commenced, and came up to some high grass opposite to Mr. Boevey. When the beaters came quite up she went at a rush past Mr. Boevey, who fired twice with a Magnum express. She rapidly made off, and as we could find no blood we had another beat. Whilst walking on ahead we heard a bekri deer bark and saw a peacock fly, which made us sure she was there. To make a long story short, she did not come up to the guns, but started off directly the beat began, passed out at the side under a tree upon which sat a sepoy who saw she had a bullet in her stomach. We found lots of blood, and pugged her up a bit, and then stopped as the sun was sinking, and the shikaris said we should find her dead next day, and if we went on some one would get mauled. Each of us being a *paterfamilias*, under solemn promises to our wives to do nothing rash, we fell in with this view. Next day we found she had drunk at the same place and pugged her into a jungle a mile off. Drops of blood were found on her path. However, although we beat for her all day we could not find her, and after that all trace of her disappeared. All said she was dead somewhere, but we could not find her, and there is no doubt that with an Express bullet in her stomach she must have died. Next day, which was a cruelly hot one, I went out at noon alone to look for her, and also to get information about the depredations of the man-eater. It is impossible to place much reliance on the various statements made to me by the various jungle men I spoke to, because it was very evident they grossly exaggerated. I was told the tiger had killed various people, from forty to 500 in number, and that last rains he had been particularly vicious in killing people engaged in cultivating their small strips of land in the jungle, and even taking people out of bullock carts carrying timber from the forests. I went to see two or three places where people were actually seized. One of these was close to a jungle road to the Dangs, over which a large timber traffic passes. I have here a photo. of one of the jungle roads over which the beast used to pass, and also of a temple to the tiger god which the Bheels erect all over these districts. On the next day Mr. Boevey had to break up camp, and leave for Surat hurriedly, as fast as we could march, in consequence of the Surat fires. I tried unsuccessfully to reason with him, that it was more important to bag man-eating tigers than inspect a fire which would be put out long before he could reach it. However my arguing did not convince Mr. Boevey, and we had to put an end to a very pleasant trip and march rapidly for the line of rails. The only real accurate information I was able to get was from Mr. Jhaverbhai Nathabai, the Dewan of Bansda, who obtained for me the names of persons killed in the Bansda State; only the villages, dates of death, age, sex, &c., which was embodied in an official document I have. This was made up from the police records of the inquests on the persons killed, and from the reports of the cattle killed in the various villages reported by patels. This only applies to the villages in the Bansda State and not to the adjoining villages in the Dangs, Baroda, and British territory. During 1888, out of thirteen jungle villages in the State he killed in six villages altogether eight people, of which seven were males, the dates of killing 28th June, 3rd July, 22nd October, 2nd November, 4th November, 12th November, 15th December, and 18th December. Of these all were adults except one boy, named Ganda Kalia, aged 13 years. In the same villages during the same period thirty-five cattle were returned as killed. I am sorry I am not able to get any record of those killed in the Dangs or Baroda territory during the same period. I have written to enquire at Bansda if there have been any more cases reported of persons killed by tigers, and I am informed by the Dewan there have been no more cases, so that this strongly supports the view that the tiger I killed was the man-eater.

Some eight years ago or so, Mr. Mulock killed an undoubted man-eater near Toongar, some thirty-five miles from where we are now sitting. I say an undoubted man-eater, because Mr. Mulock was close by when the man was carried off, and went after it at once, and found the half-devoured corpse. Whilst waiting by the corpse the tiger or tigress (I forget which) returned, and Mr. Mulock killed it and made a *post mortem* examination of it, finding parts of the deceased man inside the tiger, so I think we may safely assume this was a man-eater. Mr. Mulock published an account of it at the time, and gave me a copy which I have unfortunately mislaid, but I think I may trust my memory so far as to say there was nothing peculiar about this tiger in any way, and that his skin was not mangy.

I have no doubt you read in the papers a short time ago of a man-eater being killed, called the Jaunsar man-eater. An account was published, in which it appeared that Mr. B. B. Osmaston, of the Forest Department, was out near Chakrata after her with a companion, when Mr. Osmaston shot her whilst she was worrying his friend.

The papers further published an account by an anonymous correspondent of the career of this tigress, and an extraordinary story of the tigress allowing her cubs to play with a man she had taken out of a house in the Himalayas. This story I have not been able to verify, so that I am not able to give you particulars. I wrote, however, to Mr. Osmaston for certain particulars about this tigress, and he has very kindly given me some interesting information about her, which I will give to you almost in his very words.

Man-eaters have been numerous in the Jaunsar district for many years. The district which this tigress frequented was a very large one. She used to make long journeys in a very short time. Having killed a man in one place, she would appear the next night at a place twenty miles off. She frequented a somewhat high belt of the Himalayas, mostly from 5,000 to 10,000 feet high. The spot where Mr. Osmaston killed her at is about 8,000 feet above the sea. No old wounds were visible, but she was very old. Report makes her out to be a man-killer of at least ten years' standing. Her skin was not mangy but a very fair one. The cold climate might, of course, give her a good skin. Her teeth were exceptionally bad. Of her four canines none were sound, and the two upper ones were worn and broken down to about half their original length. They also had two slight cavities in their centres, which were found by probing to extend to a depth of three-quarters of an inch. Mr. Osmaston has sent the drawings of the canines, which can be sketched in our magazine if thought of sufficient interest About seven or eight porcupine quills, mostly broken off to about three inches in length, were found in the tigress's body. Two were actually embedded n her tongue. There is not very much game suitable for tigers in the district. Buffaloes and men are easily obtainable, and excellent opportunities afforded of seizing them on the march on the mountain sides.

This tigress appears undoubtedly to have been the man-eater, because she actually attacked Mr. Osmaston's companion without provocation, except in so far as was due to the fact that these two gentlemen went up in broad daylight to a buffalo killed by her. The papers stated Government offered a reward of Rs. 500 for her.

I once had another adventure with an alleged man-eater. I have, however, no evidence to offer that it was a man-eater, except the fact that all the shikaris and villagers of the neighbourhood declared that this was the particular miscreant that had eaten a number of people in the neighbourhood, and that every villager for miles round, in number nearly 500, turned out to assist as beaters. This was in the State of Rewa, a few years back one of the best tiger countries in India, where tigers are always ready for visitors of distinction in a State preserve specially kept for tigers and other large game. Through the kindness of Major Barr, the then Political Agent, I was asked to form one of the usual hot weather party who made an annual campaign against the tigers. We shot in royal style: we had State elephants, shikaris, sowars and all the assistance we required. All we had to do was to go to the places fixed for us by the head shikari when we got *kubber*, and if we did wound a beast, we had only to get on two of the best elephants in India and follow up. Following up a wounded tiger on an elephant I must say is a royal form of sport. It is a grand thing to see a wounded and irate tiger absolutely at your mercy and without incurring any risk to yourself. You have all the fun and none of the danger one experiences in going after a beast on foot. I was once so excited in watching a wounded tiger charging from a long distance at my elephant, that I invoked the anger of the mahout for not firing soon enough. I forgot for the moment that if any one was in danger it was him and not me in the *howdah*. To return to the man-eater. Soon after the beat commenced I heard the tiger coming up towards my tree, and it remained within about sixty yards of me for some time, giving low growls. I could not, however, manage to see him. However, a few minutes afterwards, I saw him lying prone on the open side of a hill opposite. I would not fire at first, thinking he might go to another gun; but after some time I very wrongly determined to fire at him, believing he was bound to go out at the side of the beat and not in sight of the other guns. I afterwards learnt there were stops everywhere, and the tiger was bound to come close to one of the guns. I computed he was 200 yards off, and sighted my rifle accordingly. I missed him. We afterwards all agreed he was only 100 yards off, which gave me a good and valid excuse for the miss. The tiger then bolted into a patch of jungle, and the beaters all got up trees terribly frightened. Two of our party got on elephants, and he passed within twenty yards of them, giving each of them a right and left easy shot. All the shots missed him, and the tiger went away in sight of every one up another hill. The beaters said he was a regular "shaitan," and no bullet could hurt him. I suppose this was said to let us down easy, but the State head shikari, Moti Singh, was terribly downcast about it, and I was horridly depressed in spirits also. However, two days afterwards we killed two tigers in one beat, and we got our good spirits back.

A common theory appears prevalent that a wounded tiger often turns man-eater, and lately in the columns of the *Pioneer,* I think, reference has been made to certain cases of wounded tigers having turned man-eaters in the Central Provinces. Wounded tigers often turn man-*killers,* but I have not obtained any evidence of their turning man-*eaters.* The difference is very great, except, perhaps, to the victim. A wounded tiger no doubt, until its wounds are healed, attacks every person who comes near to it. It does this not for the purpose of obtaining food, but because it is smarting under a painful wound, and it believes that the person approaching it is going to inflict another wound. Many instances can be quoted of wounded tigers killing persons approaching them after they have been wounded, and I need only mention the case of my friend the late Mr. G. L. Gibson, a member of our Society, who died here from wounds inflicted by a wounded tiger he was seeking for, and whilst he was examining the body of a native boy which he found killed by this wounded tiger. This is the chief danger of leaving a wounded tiger, as one knows that the first person who unfortunately comes near the place where the tiger may be lying down will undoubtedly be killed, and many sportsmen therefore very properly prefer to run considerable risk in killing a tiger they have wounded, rather than allow it to live and kill the first innocent person who may be so unfortunate as to come near it. Mr. Mulock writes me as follows, viz., " My theory is that if one member of a tiger family takes to "the man quarry they all lose their fear of the biped and kill him "when hungry. I have found this in one or two instances." I observe also that Mr. Saunderson in his book scouts the idea of man-eaters being mangy, and wonders how this idea became prevalent.

To sum up then, I have no particular theories, with one exception, to put before you as to man-eaters. The one theory I can advance is that the man-eater inherits this vice from its parents, or that the parent having previously learnt this vice from a parent or companion, teaches the cub to kill human beings, and such cubs, when grown up, teach the vice either to their own cubs or to their mates, and so the practice never dies out amongst the tigers of that district. In short I contend that, unlike the case of the poet, the tiger is sometimes born a man-eater and sometimes made one. This theory will account for some districts never being entirely free from man-eaters.

In all cases it appears the man-eater shows greater cunning than usual. I have no evidence to show that the tiger turns man-eater for any particular reason, and I can offer no theory. There is abundant evidence to show that the man-eater is physically not different from the ordinary tiger, that age has nothing to do with the question, and that the theory about the manginess of his skin is mere fiction. There is evidence to show that districts in which the tiger has plenty of his natural food are just as much infested by man-eaters as in those districts where the natural food is less abundant. I am afraid my paper is of a mere negative character, and I leave it to some other members to evolve some theory for us on the subject.

Statement showing the number of persons and animals killed by a man-eating tiger during the year 1888, *in the territory of Bansda.*

Name of Village.	Name of person killed.	Age.	Sex.	Caste.	Date of death.	Animals killed.			Remarks.
						Cows.	Bullocks.	Goats.	
Ambábári ...	Ardiá Bápudiá	30	Male	Kukná	15-12-88	1	...	..	The tiger was killed by Mr. R. Gilbert, Solicitor, Bombay, whereby the locality has been relieved of the terror.
Tádpádá	Gándá Kaliá ...	13	Do.	Koli.	18-12-88	..	...	...	
Waghai	1 Kesu Punio	60	Do.	Káthis	31-7-88	..	..	...	
	2 Tolia Bablia	45	Do.	Kukná.	22-10-88	...	..	...	
Sádad Devi ..	... ..	..	......	......	......	5	6	...	
Wáti	......	..	......	......	......	4	1	...	
Khámblá	1 Jivla Kasa	37	Male	Wárli.	2-11-88	...	...	...	
	2 Radio Bhil	36	Do.	Koli.	28-1-88	...	..	...	
Sitápur	......	...	......	......	......	1	2	...	
Máhuvás	Bai Radgi......	30	Female ...	Kukná	4-11-88	...	...	...	
Cháranwádá .	......	...	......	......	......	1	...	...	
Godhbári ...	......	...	......	......	......	...	2	..	
Kharjai	......	..	......	......	......	3	5	8	
Manpur	Budhia Náthá	50	Malo	Káthia	12-11-88	..	1	2	
Dhákmál	......	...	......	......	......	1	2	7	
			7 Males. 1 Female. 8	......	......	16	19	17	

JHAVERBHAI NATHOOBHAI,

30*th April* 1889. Devan of Bánsdá.

THE CAMEL.

By J. H. Steel, A.V.D.

(*Read at the Society's Meeting on 10th July* 1889.)

In dealing with a subject so large and so interesting as the camel, one hardly knows where to begin and where to leave off. It is extraordinary how various estimates have been formed of his value. Mahomed says of him that he is the greatest of all the blessings given by Allah to mankind; recent writers have represented him as ugly, spiteful, unreliable at work, stupidly phlegmatic, malodorous, and endowed with all the bad qualities under the sun; his very virtues, especially steady endurance of excessive toil, being attributed to want of sensibility and of even the faintest gleams of intelligence. The songs of the Arab of the desert are about the camel, as one of the most beautiful of created beings; the remarks of the British soldier and transport regimental officer about his baggage camels are not suited to ears polite! Who is right and who is wrong? We can have no hesitation in taking the side of the Arab. Still there is some excuse for the recent military opinion on this subject, because undoubtedly in the Soudan, along the Nile, and in Afghanistan camel transport has not been a success, and the poor beasts have died wholesale as a rule. The Russians in Central Asia, the French in Algeria, and, recently, the Italians in Massowah, have been quite as unsuccessful as we in our various campaigns as to keeping their camels in health and efficiency. Individual officers have solved the problem of how to keep camels at work, and prove them valuable on a campaign; but our troops have most certainly not been successful; however, surely, if overladen animals have not their saddles removed for a fortnight, we cannot wonder to find horrible sores on their backs; if animals remain ungroomed and tied up in lines or on the march for months together, we cannot wonder if they get mange in an aggravated form; and if animals get no food nor water for a week, we cannot wonder that they at last fall and die under their heavy burdens. To sum the matter up in a few words. If men have in war emergency suddenly to deal with an animal about which they know nothing whatsoever, the animal must not be blamed that the results are not altogether satisfactory. The knowledge of the camel possessed by the untravelled Briton is easily summed up. Firstly, he is certain that the animal is the "ship of the desert."

Secondly, that it has something to do with the eye of a needle. Thirdly (and most positively) it is a sort of travelling reservoir, consisting of inexhaustible water tanks and never needs to drink. Fourthly, it has a hump and long legs and neck. Finally, it is an uncanny brute of strange habits, suited only to the wandering Bedouin of the desert and the inimitable Barnum. When called on in the emergencies of service to take charge of camels, the principle an Englishman works on is to treat them as much as possible like the beast of burden, with which he is most familiar, the horse. Where this has been carried out thoroughly the results have been not unsatisfactory, for when groomed regularly the camel does not get mange, when properly saddled and loaded he does not get sore back, and when properly fed and watered he remains serviceable and does good work. It is when our soldier is given several camels to take care of, and is aided only by a lot of lazy, cowardly coolies, who know as little about a camel as he does, and have no intention of trying to do anything whatsoever for their pay, that the poor brute fails. The water-tank theory is an unfortunate one. Certainly a camel can go for seven days without water when properly cared for, but he ought to be watered once a day whenever possible, and stinted in this respect only in extreme emergency. There are pouches in his stomach, and they are frequently, after death, found to contain fluid; but that they are reservoirs pure and simple is doubtful; and it is very certain that the parched traveller who has to cut open his dying camel and obtain its accumulated stores of water, will obtain only a very little fluid, of a temperature of about 90° Fahr., a mawkish sub-acid flavour, and an unpleasant odour. It is evident that the time-honoured water-tank theory needs much modification, and is a dangerous one to insist on as a guide to practice during campaigns. As a matter of fact, the active and special services of camels in war and peace have been most extensive and valuable. That they have been associated with enormous losses is due to our ignorance and mismanagement, and is decidedly not the camel's fault. In Afghanistan, the Punjab, Sind, and Beluchistan, in Abyssinia, Egypt, and the Soudan, the camel has been essential to success of the operations; and it is certain that when we need to fight in China, Central Asia, Western Asia, Arabia, and North Africa the services of this extremely valuable baggage animal will be again called for. The camel is, I believe, under a cloud now in official estimation, but, like the Royal Marines, he has done good service on many an occasion, and is always ready to do it again and sure to turn up when there is hard work going. Although the camel spits and grumbles when being loaded, though he makes unpleasant noises in the camp at night, and though he is generally considered unlovely in the extreme—and certainly no European nose can appreciate his odour—these unpleasant habits and conditions are to my mind more than redeemed by the undaunted and plucky manner in which he plods on with his load until he actually falls dead, by the stolid manner is which he remains quiet after a mortal wound until he rolls over on his side to die, and by the way in which he steadily plods on mile after mile under his heavy load until the halt is called, even for a march of considerably more than regulation length. The peace services of the camel are not less meritorious than his war services. His function as ship of the desert is gradually being taken away from him by the spread of railways, as in Rajputana, Sind, Central Asia, and Egypt, and we have historical evidence that his range has been limited to an extent since when the westward and eastward waves of the Mussulman invasion extended from Spain in the West to Southern India in the East. A few representatives remain in Spain, very few in Mysore, and in Europe practically the only camels are the stunted race of Pisa, which seems to have been introduced somewhat recently from Tripoli. I believe there are camels in Constantinople and European Turkey; I observe that General Gordon writes of them in Turkey. I noticed recently in the Royal Dublin Society's Museum a sowari camel on a real and antique Irish harp as its prominent decoration: how it came there I cannot surmise! I have somehow arrived at the impression that in Asiatic Russia, in the Caspian region, and Crimea, especially of European Russia, the range of the two-humped camel is becoming restricted by railway development. Expansion of range is taking place in the Southern States of America, where imported camels have done well and are multiplying rapidly, and in Australia, whither they have been imported from India, and where have been established breeding stations. It is considered that the camel will prove specially valuable in opening up Central Australia. In Mongolia, Western China, the Central Asian Desert, the Khanates, Afghanistan, Beluchistan, Persia, Asia Minor, Arabia, and the whole desert area of Northern and Central Africa the camel reigns supreme as a means of transport for goods and travellers. Tradition has it that the camel invaded Africa by way of the Isthmus of Suez; he has invaded America and Australia by sea. It is reasonably surmised that the camel is decreasing in numbers; one of the Caliphs, for example, is credited with assembling 120,000 camels for a journey to Mecca. Here we are face to face with one of those difficulties constantly appearing before naturalists. Some allowance must be made for oriental exaggeration in the actual statement of numbers, and for unintentional multiplication in quality and quantity by *laudatoris temporis acti,* people who systematically run down the present in comparison with the past. The two-humped or Bactrian camel is much less frequent than the true dromedary or one-humped species. Palgrave, the celebrated traveller, is responsible for introducing serious confusion between the terms dromedary and camel. He has tried to restrict the former to the hygeen or running camel, known to us as sowari, and to make it out to be a distinct breed. This is not correct. The fact of the case is, that wheresoever camels are freely used and bred there are found well-bred light animals suited for sowari, and heavier, coarser bred individuals suited for baggage duties. According to the requirements of the locality the former or the latter predominate. There are very many local *varieties* of the camel, but only two species (*a*) the Southern, Arabian, one-humped camel, or true dromedary, and (*b*) the Northern, Bactrian, two-humped, or "true" camel. Where the two meet is the line of the Euphrates and Tigris; a few Bactrians have passed into Arabia, and I believe the two-humped camel is the one which has been imported into North America by the United States Government. In Northern Persia and Afghan-Turkestan the two species are found, and sometimes they cross and produce a hybrid. It is the one-humped camel which has invaded Australia, that of Bikanir in Rajputana, which shares with Jessalmir the honour of being the best places in India for camels. The Bactrian camel is very tolerant of cold, he works across snow on the Steppes, and is said to eat snow when he becomes thirsty; the dromedary is intolerant of cold, but will stand a remarkable amount of heat. Moisture in the air is probably the condition of climate of which the camel is least tolerant. No animal will travel better over sand, for which the peculiar structure of the foot, the deliberate action and the length of limb well suit him; mountainous passes are trying only to plain camels; even deep rivers with sandy bottoms can be forded by this animal, but a clay bottom and slippery soil proves very trying to him, especially under a heavy load, and deep ditches or cracks in the soil prove serious impedimenta, because camels cannot do much in the way of jumping, except occasionally performing some awkward and grotesque gambols. One great desideratum in a transport animal is that he is capable of use in various ways. The camel can hardly be considered inferior in this respect. Besides sowari and pack work he carries small guns or will drag larger ones; he is used in high, peculiar, double-storey carriages (in the Punjab for example). General Gordon writes that they are used for ploughing in Turkey, and that they make excellent tramway animals! The products of camels are most useful—fuel, milk, excellent hair for shawls, cloths, and various fabrics, both coarse and fine, are obtained from the living animal; flesh-food, leather, bones, and various other useful substances from the dead. No part of the dead camel should go to waste. In camel countries these animals are used to afford amusement by combats, running races, or are trained to special performances, such as dancing. The adaptations of the camel to the desert which is its home are numerous and evident. Among others they are his height giving wide range of vision; his length of neck enabling him to reach far to the shrubs on either side of the track suited as food; ears very small, and nostrils capable of closure to keep out the sand; eyes prominent and protected by an overhanging upper lid, limiting vision upwards and guarding from too powerful rays of the sun; his horny pads to rest on when he lies in the hot sand; his peculiarly cushioned feet; his hump or reserve store of nutriment; his water reservoirs in connection with the stomach; his patient, plodding habits. It is a great mistake to consider the camel ugly. "Handsome is who handsome does" applies well in this case; but it is universally admitted that though a mangy dromedary in a show or transport lines is not handsome, a well kept camel in his native place is not ugly but quite the reverse! In the loneliness of the desert travellers recognise the camel and his movements not only as suitable, but sometimes as graceful, and even grand. We have this opinion in many well-known works of travel. It is well worth the while of any of my hearers who has not looked into the eye of a camel, to do so on the earliest possible occasion. I particularly admire its rich colour, its large size and clearness, and the stern aspect produced by the overhanging brow. Camels are much blamed for objecting to their packs being put on, but they are a sa rule fully justified in doing so, for the loads are (as they have almost invariably been found in the past) uncomfortable in the extreme, not unfrequently absolutely cruel. The peculiar arrangement of the camel's teeth makes his bite very formidable, and gives him a specially ferocious expression. He alone of ruminants has incisor teeth in the upper jaw, but in many other respects he is an aberrant ruminant, many of his anatomical details more resembling those of the horse than of the ox. Here I am in a position through the kindness of Mr. W. Home, of Jodhpore, and Mr. Phipson, to exhibit a most remarkable specimen—a horn taken from the forehead of an Indian camel. This may be a simple keratoid tumour accidentally occurring in this situation, but it gives scope for the general conclusion that the camel may, very occasionally, be found with a horn indicating his zoological affinities with other ruminants. This will not seem so far-fetched if we remember the undoubted fact that horses occasionally have frontal horns. The shape of skull of both horse and camel is such as would lead the zoologist at once to conclude that the animal was hornless. Even in cattle and sheep, when the temporal fossæ become very large, the horns are shed by a species of natural amputation. Charles Steel records having observed in Afghanistan that the Bactrian camels sometimes have an extra rudimentary toe, and so are specially sure-footed. The hump of the camel resembles that of the ox in structure but is much less muscular. The one-humped camel has a rudimentary second hump, so that this distinction is not so very considerable after all. In camels low in condition the hump almost disappears, the animals are described as "living on their humps."

Finally, I trust I have succeeded in establishing to the satisfaction of my hearers that the camel has been much and undeservedly maligned by Europeans, and that the Arab's estimate of him is more just and in accordance with the services he has rendered to mankind in the past and continues to render in the present. I can honestly say that my personal and professional contact with the camel in the course of journeys, on the line of march, in camp, and in cantonments, has impressed me with a high sense of the value of these long-suffering and most useful animals.

HOW TO FACILITATE THE STUDY OF BOTANY.

By G. Carstensen, Grad. Hort. R. D. C. Agr. (Copenhagen),

Superintendent of the Victoria Gardens, Bombay.

In his "Address to Students of Botany," lately published in the Society's Journal, Mr. A. K. Nairne has attempted to indicate a way by which the study of Botany, or at least the knowledge of common Indian plants might be facilitated. Though the originator of the proposed system is no less a person than the celebrated philosopher, Jean Jacques Rousseau, the system as explained by the author of the address is very deficient, and a closer examination of its details will easily convince the botanist that such a limited definition of characteristic features, peculiar to species, genera and even Natural Orders, as those mentioned in the address, are likely to do much more harm than good, and give rise to serious mistakes. Thus the author remarks, that if a plant with this kind of flower (didynamous, or two-powered) is a tree, it most probably belongs to *Bignoniaceæ,* which very characteristic and distinct order he defines as often being large trees with ample leaves and large flowers, and often pod-like fruits, easily recognised by their vernacular names, but he omits to mention the frequent presence of pinnate (finned) leaves; the constant presence of the peculiar bilamellate (two-plated) stigma (scar), and frequently winged seeds, by which any plant belonging to this Order may be easily recognised. Following the author, at least one tree, which is very common in the Konkan, *Gmelina arborea,* except for its vernacular name, ought to belong to *Bignoniaceæ,* whereas it does not require more than ordinary botanical knowledge to recognise it as belonging to *Verbenaceæ,* of which Order the author simply says that it is not clearly defined, often trees and shrubs. Similar examples might be cited of other misleading statements too evident to avoid being noticed by the botanist. I have, however, no intention of criticising a paper attempting the praiseworthy object of facilitating the study of Botany, an object to which I hope by the present paper to contribute my humble share.

Regarding Botany as a science, and not only as a knowledge of names, a pleasant entertainment, or a feeble kind of sport, it may be said, as of all sciences, that a little knowledge is worse than no knowledge at all; and I cannot help considering it wrong to attempt to popularise it by considerably curtailing its general principles and omitting important significant facts. Only the thoroughly instructed student will arrive to that climax of wisdom, where he with the Greek philosopher admits that he knows comparatively nothing, the only true inducement to an irresistible craving for further knowledge.

Now Botany is not a popular science, though it certainly deserves to be so. Only by the aid of this very interesting branch of Natural History do we learn to know the source of most of our articles of food, the raw materials of most industries, and the remedies for our diseases, &c., &c.; while a closer study of the details will show us the most wonderful organizations, the most perfect designs, and the most ingenious structures and contrivances, and nowhere, perhaps, is the greatness of creation more apparent and deeper impressed. The first great branch of Botany, is Descriptive Botany, or the knowledge of the exterior features of plants, which is the only branch of Botany that ever can be popular as a study, while the more intricate branches, known as anatomy and physiology, require the aid of the microscope, and a considerable knowledge of natural philosophy and chemistry to enable the student to comprehend their details; and must therefore necessarily for ever remain the property of a selected few. Descriptive or systematic Botany is doubtless the most important for all practical purposes, and no attempt should be left untried to facilitate the study of this knowledge. Among the numerous attempts which have been made with this object in view, none are more important than the arrangement or grouping of plants in definite orders or families, specified by peculiar features of the plant or parts of the plant. Here we must distinguish between artificial and natural systems, the first relating to a single peculiarity only, the last to the general features of plants. Among artificial systems, the only one which is important and has ever been popular is the Linnæan arrangement, in which the classes and orders are defined by the number and character of the sexual organs. It has the great advantage of being easily comprehended, and of being very useful for all practical purposes, but of late its popularity has greatly decreased, because it has the great drawback of leading to a superfluous knowledge of plants, without furthering science, and easily causing serious mistakes and leading to wrong conclusions. The Natural systems require a great deal more of study, and cannot be mastered without an almost perfect knowledge of Descriptive Botany.

The founder of the Natural arrangement of plants was a Frenchman, A. de Jussieu, and so clear and excellent was his system that the alterations made by De Candolle, Endlicher, Lindley, Bentham and Hooker, Baillon, &c., are merely a consequence of the enormously increased number of species now known to science as compared with Jussieu's period of life, or they are attempts at sub-division into more comprehensive groups, of which several, for instance that proposed by the great botanist, Professor Lindley, have proved too artificial, or to be founded on such minute details that they are unserviceable for practical purposes. The system now generally accepted, at least in the British possessions, is that laid down in Bentham and Hooker's Genera Rusitorum, but even yet at this period of advanced science, plants still exist which cannot easily be referred to any of the Natural Orders, without being sufficiently characteristic to justify the establishment of a new separate order, and it is probable that owing to the origin of the different forms of plants, by gradual alterations, as indicated by Darwin, there will always be found intermediate links and doubtful forms that will baffle any attempt at a complete classification. Even in such a large and well-defined class as *Dicotyledons* (two-seed-leaved), we find exceptions in the peculiar features, as the one-seed-leaved *Cylamen*, and in *Cuscuta*, without any seed-leaves at all.

All these attempts at facilitating the study of Botany are very useful for anybody acquainted with a preliminary knowledge of Botany, but do not give any assistance to the layman who intends pursuing the study, but to his or her disgust finds that before finding out the name of a plant or the order to which it belongs, he must work through a number of more or less unintelligible terms, which are too often a stumbling-block for the would-be student of Botany. My experience has also taught me that the study of Botany is far more popular in the northern countries of the Continent than in the far-stretching British possessions, and I cannot help thinking that this fact must be chiefly attributed to the difference in the botanical terminology. While the terms used in English works on Botany are too frequently quite unintelligible for the layman, because they are in most cases Anglicised Latin words, the terms used by German and Danish authors are generally easily comprehended, because they are translated into the mother-language, refer to objects of daily life, or are derived from the language itself. Though I am not an Englishman, I think I have a sufficient knowledge of the language to rest assured of the possibility of substituting English, or at least English-sounding words, for the modern botanical terms, and in many cases I find that such terms really do exist, but are sparsely used.

Convinced as I am that a reform of the more unintelligible terms would serve the purpose of facilitating and popularising the study of Botany more than anything else, I venture to propose that the Botanical Committee of this Society be requested to revise the existing terminology and to substitute English and intelligible terms for the more unintelligible ones.

In order, however, to show that my project need not meet with serious obstacles, I shall take a few examples of commonly used terms and suggest English substitutes for them.

The Natural arrangement of plants consists of two large divisions—

Phanerogams, or "Flower-plants."
Crytogamous plants, or "Spore-plants."

"Flower-plants" are again divided into—

Dicotyledons, or "Two-seed-leaved."
Monocotyledons, or "One-seed leaved."

The "Two-seed-leaved" in—

Angiosperms, or "Seed-vessel-plants."
Gynosperms, or "Naked-seeded plants."

The "Two-seed-leaved" are sub-divided into—

(*a*) Polypetalæ, Eleutheropetalæ, or "Free-crown leaved," with the groups—

	Thalamifloræ,	"Top-flowered."
	Discifloræ	"Disc-flowered."
	Calycifloræ	"Cup-flowered."
(*b*)	Gamopetalæ,	"Entire crowned."
(*c*)	Apetalæ,	"Crownless."

These groups are again divided into Natural orders, too numerous to enumerate here, the Latin names of which in many cases might advantageously be substituted by existing or new English ones, as—

Ranunculaceæ	by the	"Crowfoot order."
Menispermaceæ	,,	"Moonseed order."
Anonaceæ	,,	"Custard apple order."
Cruciferæ	,,	"Cross-flowered."
Malvaceæ	,,	"Hollyhock order."
Sterculiaceæ	,,	"Flame-tree order."
Tiliaceæ	,,	"Lindenbloom order."

Sapindaceæ	by the	“ Soap-tree order.”
Leguminosæ	,,	“ Pod-fruited.”
Rosaceæ	,,	“ Rose order.”
Myrtaceæ	,,	“ Myrtle order.”
Rubiaceæ	,,	“ Coffee-tree order.”
Compositæ	,,	“ Head-flowered.”
Apocynaceæ	,,	“ Twisted-flowered.”
Asclepiaceæ	,,	“ Silk-seeded.”
Boragineæ	,,	“ Rough-leaved.”
Bignoniaceæ	,,	“ Gaping-flowered.”
Scrophularineæ	,,	“ Mask-flowered.”
Labiatæ	,,	“ Lip-flowered.”
Acanthaceæ	,,	“ Shield-flowered.”
Amaranthaceæ	,,	“ Cockscomb order.”
Polygonaceæ	,,	“ Buckwheat order.”
Euphorbiaceæ	,,	“ Milkwort order.”
Urticaceæ	,,	“ Nettle order.”
Amentaceæ	,,	“ Catkin-flowered.”
Coniferæ	,,	“ Fir order.”
Cycadeæ	,,	“ Cone-palms.”
Aroideæ	,,	“ Spindle-flowered.”
Cyperaceæ	,,	“ Half-grasses.”
Gramineæ	,,	“ Grasses.”
&c.	&c.	&c.

The Natural orders consist of genera, for which word I should substitute “ forms,” and these again of species or “ kinds.”

Regarding the details of the plants, the following short sketch may serve as an illustration of a revised terminology.

The complete flower consists of four different kinds of transformed leaves. The outer series or “ ring ” is the calyx, “ the cup,” formed of free or united sepals, “ cup-leaves”; next comes the corolla, “crown,” formed of free or united petals, “ crown leaves”; the “cup” and “crown” together are called perianth, “ floral cover,” which is termed double when both cup and crown are present, single when one of either is absent, in which case it is either calycine “ cup-like” or corolline, “ crown-like.” When the floral cover is entire, the lower part is called the tube, the upper part the limb, collar, which may be campanulate, “bell-shaped”; rotate, “ wheel-shaped”; hypocrateriform, “ saucer-shaped,” &c., &c. Next comes the andræcium, the male organs, consisting of stamens, “ dust bearers,” which are generally composed of filaments, "dust-threads" and anthers, "dust-buds," containing one or two (rarely more) anther cells, "dust bags," filled with pollen, "dust." The innermost part of the flower contains the gynæcium, the female organs, consisting of pistils, "dust-channels," generally composed of an ovary, "fruit-bud," and a style ending in a stigma, "scar." The "fruit-bud" is formed of one or more carpels, "fruit-leaves," furnished with placentas, "egg-stools," to which the ovules, "eggs," are attached either directly or by a funicle, "egg-string," the point of attachment being termed hilum, umbilicus, "navel." The "fruit-bud" develops into fruit, of which a great many forms are known; a few of the more important are the legumen or "pod"; the lomentum, "jointed pod"; the follicle, "podling"; the siliqua, "double-pod"; the silicula, "short-pod"; the capsule, "burst-fruit"; the achene, "nutlet"; the samara, "wing fruit"; the carcerule, "split fruit"; the pyxis, "lid-fruit"; the nut; the berry; the pepo, "gourd fruit"; the pome, "pip-fruit"; the cone; the strobilus, a scale-cone"; the serosis, "fruit mass"; the sycomus, "cup-fruit," &c., &c. The fruit contains seed, consisting of a testa, "skin"; a perisperm, "rind"; and frequently albumen, "seed-yolk," always enclosing the embryo, "germ," consisting of a radicle, "germ root"; cotyledons, "seed leaves"; and a plumule or gemmule, "germ-bud."

Returning to the flower it will be seen that its different parts are inserted on a receptacle, "fruit seat," and according to the position of this, the flowers are termed hypogynous or inferior, "low seated"; perigynous, "middle-seated"; and epigynous or superior, "high-seated." The flower is either sessile, "sitting," or pedicellate, "stalked." The pedicels, "flower-stalks," spring directly from the stem or form part of an inflorescence, "flower-stand," which can assume a great variety of forms—the most important with "stalked" flowers, of which are—the raceme, "spray"; the corymb, "cluster-spray"; the panicle and thyrse, "bunch"; the umbel, "tassel"; the cyme, "fork," which may be dichotomous, "two-pronged"; trichotomous, "three-pronged"; or scorpioid or circinate, "coiled"; and then secund, "one-sided"; the fascicle, "cluster," &c. Among "flower-stands" with "sitting" flowers, the most important are the spike or ear; the amentum or catkin; the strobile, "scale-cone"; the spadix, "spindle"; the capitulum or head; the hypanthodium, "cup-flower"; and the glomerule "ball." The flowers are frequently accompanied by small leaves, bracts, "shields"; and bracteoles, "shieldlets." The stalk of the "flower-stand" is termed peduncle, "flower-stem"; when rising from the ground, and not forming part of the stem, it is called scape. The flower-stand is often more or less enclosed in a spathe, "wrapper"; or an involucrum, "skirt."

The leaves consist of the blade, the petiole or "leaf stalk," and sometimes the "sheath" and stipules, "leaflings." The buds formed in the angle between the stem and the leaf are called axillary buds, "corner-buds." Leaves may be linear, lanceolate, "lancet-shaped"; elliptic, "oblong"; ovate, "egg-shaped"; cordate, "heart-shaped"; hastate, "spear-shaped"; cuneate, "wedge-shaped"; orbicular, "round"; ob-ovate, "reverse egg-shaped"; reniform, "kidney-shaped"; peltate, "shield-shaped," &c. &c.; entire, undulate, "wavy"; sinuate, "scolloped"; dentate, "toothed"; serrate, "saw-toothed"; crenate, "round-toothed"; lobed, laciniate, "jagged"; fimbriate, "fringed"; semi-pinnate or pinnate partite, "half-finned"; pinnate, "finned"; bi-pinnate, "double-finned"; palmate, "fan-shaped"; digitate, "fingered"; pedate, "foot-shaped," pedati-sect, "foot-fingered," &c., &c.

This is naturally only a short sketch, and only a few of the numerous botanical terms have been mentioned, but I should be very happy if the Society would give its support to a complete revision of all the existing botanical terms, and I have no doubt that such a step would lead to vastly increase the number of students of Botany, and in the end would materially further the progress of this unfortunately neglected science.

In conclusion, it may be remarked that such a revised terminology could not be advantageously used in purely scientific works, calculated to have a cosmopolitan distribution, but such works should be written in the Latin tongue, which for foreigners at least is not more difficult to understand than the existing English botanical terminology.

AN INDIAN NATURALIST'S TRIP TO AUSTRALIA.

By Surgeon-Major K. R. Kirtikar.

To a student of Botany and Zoology the vast island-continent of Australia affords an interminable field of the most interesting and instructive research, whether it be from the abundance of Natural History objects, or from their varied character and striking contrast as compared with the Flora and Fauna of this country. India with all its richness and variety of vegetation has nothing to compare with the Eucalypts and Acacias of Australia. One would hardly think, as you approach King George's Sound by steamer, and cast your eye now hungering to see land, along the barren coast of Western Australia, that what appears but a dry sand-bank or a sand-hill, is covered over with vegetation which, though it may be scanty here, and merely scrub-like there, affords the student of nature as rich a subject in foliage and timber as it is varied in the forms, colour and beauty of its flower, fruit and seed.

Even the voyage itself to Australia is full of interest to a marine zoologist. Soon after you cross the Equator you see the Flying fish (*Exocetus volitans*) jumping up in the air from the surface of the disturbed water as the steamer cuts her way across it. That they have no real power of flying is an undisputed fact, for—says Dr. George Bennett, that veteran naturalist, who is now in the eighty-third year of his age, and who was one of the earliest scientific explorers of New South Wales—fishes of the so-called flying genus (*Exocetus*) have "no power of elevating themselves in the air after having left their native element; for on watching them, I have seen them fall much below the elevation at which they originally rose from the water, but never, in any instance, could I observe them rise from the height at which they first sprung." They are, however, able to maintain brief temporary flights in the air, says Magnin, a French writer, through the extraordinary size of their membranous pectoral fins. My own idea is that they quit the water only when they are frightened by the advance of a steamer, or to escape the maws of sharks and other larger piscivorous fishes or sea-faring birds, such as the gulls and albatrosses that pounce upon them with lightning speed. They hardly rise more than from fifteen to eighteen feet above the level of the water, and the height of their leap depends entirely upon the force of their first spring, which having reached, they fall by their own weight, without the slightest power of maintaining themselves in air. They fall and rise again, and go on doing so by the hundred and thousand for a considerable distance. In the tropical sun as they rise from the silvery crest of the deep blue wave thrown into ample folds by the advancing prow of the ship, their silver blue wings and glittering bodies present a spectacle which is charming to the eye, and affords occupation to an idle mind on board a steamer.

The porpoise is another denizen of the Indian and Southern Ocean which attracts our attention. The graceful rise and fall of these marine creatures, as they run a race with the advancing steamer, has the appearance of child-like mirth and frolic, which create an interest for their movements in their spectators and make up for their squalid and utterly uninviting appearance. For miles together in pairs, or singly by the dozen or by the score, these heavy-looking cetaceans rise and sink with an ease which is surprising. Now alongside of the vessel, now under the keel, rushing from one side to the other, they cross the path of the ship with a rapidity which is marvellous in the extreme, evidently conscious of the gazer's eye and bent upon eluding it while frolicking about the ship.

As we enter the "Heads" and anchor at Port Melbourne in the vicinity of the P. & O. Co.'s pier jutting right into deep water, we see innumerable *Medusæ,* the living seaweeds as a French writer calls them—

> "With the freedom and the motion
> With the roll and roar of the ocean."

These magnificent opal globes, or bell-shaped discs of soft jelly are beyond description. They have to be seen to be admired. They are better seen and watched when the vessel is at a stand-still, and when they come in search of prey close to the sides of the vessel working their way up and down with the alternate contraction and expansion of their globular bodies, and rendering their manœuvres graceful by a similar movement of their numerous frills and prehensile tentacles, which at once mark them out as some of the most charming and elegant objects of oceanic creation.

There are besides innumerable sparkling animalcules visible at night, especially at the side of our vessel, causing the phosphorescent appearance which has for many years been the puzzle, not only of ordinary spectators, but even of accomplished natural historians. It was at one time considered that oceanic phosphorescence was due to the putrefaction of dead and decaying fish. But we know that the conditions of death and decay are not essential to the production of phosphorescence. We know that the common glowworm or fire-fly of our rainy season is a living entity emitting light on a dark night, when *living* and in a state of perfect health. That phosphorescence is due partly to the decay of phosphorous-holding fish is a fact, but it does not sufficiently account for the entire oceanic phenomenon. That marine zoophytes of extremely small size have their share in the production of this phenomenon, is a fact beyond dispute.

Being more of a botanist than zoologist, to me the floating vegetable seaweeds had more charm than the phosphorescent zoophyte, or the living seaweeds, the flying fish or the graceful porpoise.

In the Bight, and at the Heads and in Port Philip, the appearance of floating *Sargassum* and *Fucus Bacciferus* looked tempting as I admired long trails of them in the crystal blue of the tranquil sea. Secure they lay in their position. My predaceous hand was beyond their reach, or rather they were beyond the reach of my onslaught. Nothing could stop the onward course of the steamer, nor even slacken her speed for the purpose of marine-botanizing on the part of a solitary individual like myself.

Phyllospora comosa is a seaweed of extraordinary length and beauty, as it is seen floating several yards with the beautiful sunshine heightening its rich olive colour. The long tape-like leaf, flat and mucilaginous when obtained from the shore, and the olive-shaped bladders with leafy expansions at the top, render the plant an object of attraction. But when you are on board a steamer there is not the slightest chance of your getting hold of these plants. They are a vexation. So on 26th December 1888, I left them in their glory undisturbed, and set foot on the *terra firma* of Melbourne to botanize in more generous and approachable regions. To an inhabitant of India, accustomed to the rich and luxurious vegetation of the Konkan, at first sight Australia appears a barren land—a dead level covered here and there with scrubby-trees which continuous drought has almost starved unto death. Often you see however tall and magnificent trees on some stratified sand stone reaching down to the ocean-strand, unaffected by the battering and beating of the ruffled waves of the salt water. The foliage, whether in the bush or in the forest, among the scrubs or among the vivid fern-gullies, varies considerably from bright dark green to dull greyish hue. Fifty-three years ago when Charles Darwin visited Australia during his voyage round the world in H. M. S. "Beagle," which laid the foundation of his future fame, and which gave to the scientific student an enormous amount of information in Natural History, this venerable scientist made a remark in his journal which struck me as an instance of Darwin's powers of observation. With reference to the vegetation of New South Wales, he says "the trees mostly have their leaves placed in a vertical instead of as in Europe"—and I may add as in India—"in a nearly horizontal position." Darwin further observes that "the foliage is scanty and of a peculiar pale-green tint without gloss." I do not know about the foliage being scanty as a rule, but there is no doubt that in a majority of real Australian trees the leaves are tough in texture, of a peculiar dull greyish hue, without gloss and perpendicular. The trees are mostly small-leaved, and if large, much dissected marginally, thus depriving them, however large they may be, of all appearance of shade or shelter. The result, as Darwin justly observes, is that the woods appear light and shadowless, and are no comfort to the traveller seeking shelter from the rays of a scorching sun. This particular appearance of the foliage of Australian plants, however, renders the study far more interesting, and invests them with a charm which would else be wanting. Compared with this often desolate looking scrub, this pale-green small-leaved bush, an umbrageous Banyan and peepul, or our mango and mowrah, or our sâg and jack tree shine at an advantage. But the chief vegetation of Australia is essentially made up of hundreds of the blue gums and red gums that go under the generic name of the Eucalypts. The genus Acaciæ, of which Baron Sir Ferdinand von Mueller—the greatest living authority on Australian Botany, and indeed one of the readiest and most accomplished Botanic experts in the world—counts three hundred well-marked species in Australia, is by far the largest in the Flora of Victoria. Apart from its being cultivated for ornamental purposes, it has its technological value. The timber of many of the Acacias is worthy of forest-culture. The Australian blackwood (*Acacia melanoxylon*) is well known among timber merchants as one possessing great lateral strength. "It is largely used," says Mr. J. E. Brown in his Forest Flora of South Australia (Pt. VIII., page 37,) "in the construction of furniture of all kinds, house decorations, railway carriages, boat-building, casks, billiard tables, pianofortes, veneers and turnery." The value of the Acacias for tanning purposes is very great. Black wattle, for instance (*Acacia decurrens*, var. *mollissima*,) yields from 30 to 54 per cent of tannin, which is said to go as far as three and a half times its weight of oak-bark. (*Haldane.*) Baron Sir Ferd.

von Mueller says one pound and a half of black-wattle bark goes as far as five pounds of oak-bark for tanning purposes. The Acacias are very quick growers, and thrive in mild climates. It would not be, in my opinion, a fruitless endeavour to experiment on the growth of these interesting and technologically highly useful plants in the milder regions of India, where there is neither much moisture nor dryness in the air, and where the climate is more equable and favourable to the growth of vegetation which partakes of a semi-tropical character. The blackwood tree is being extensively cultivated for its timber and bark in Portugal. The Acacias of Australia to my mind appear to be of much practical interest, inasmuch as in India we have several varieties, such as the *Acacia catechu, Acacia arabica, Acacia concinna, Acacia procera,* yielding gum, tannin and useful timber. Some of the Australian Acacias are very gay and lovely, and some sweet-scented. The most attractive object throughout the whole range of Australian vegetation, however, is the interminable genus Eucalyptus. Its height in proportion to the period of its growth is simply marvellous. It is unparalleled, says the Baron von Mueller, in the celerity of its growth among hard-wood trees. Tall and erect, towering high in air, often with a tender-looking stem and bluish foliage, these trees are among the first to attract a traveller's attention. When in flower, they are exceedingly pretty, especially those with rich crimson and scarlet bunches of flowers. The gum trees are not all of uniform appearance as regard their central stocks and stems. Some shed their barks annually, and are thus named the "stringy bark." Large masses of this bark are seen sometimes peeling off from the stalk and hanging the whole length of it. I have here a specimen of the bark of *Melaleuca genistifolia,* belonging to the natural order Myrtaceæ, to which the Eucalyptus genus belongs. It is called the paper bark tree. It will give you an idea how microscopically fine the bark layers are. It was taken from the Melbourne Botanical Gardens at the kind suggestion of Mr. Guilfoyle, the accomplished Director. To Mr. Guilfoyle's generosity this Society should feel particularly indebted when I say that the specimen papers and fibres which are placed before you to-day, and presented by me to the Society, are the unstinted gift of Mr. Guilfoyle.

But let me proceed to further describe the Flora. The Myrtaceous plants are numerous in Australia. The Melaleucas and Callistemons are very graceful when in blossom and even out of blossom. The brilliant dense crimson cylindrical spikes of the latter are particularly charming and look very much like the flower heads of the Banksias. There are four orders which are exclusively Australian throughout the whole vegetable kingdom, *viz.*, the Myoporinæ, the Epiacridæ, the Goodeniaceæ, and the Candollaceæ. Of these the Myoporinæ, says Baron von Mueller, "are remarkable for their foliage and delicately-tinted and richly-marked flowers which are to be seen adorning the scrubs and garden shrubberies from year's end to year's end." The natural orders Proteaceæ and Pittosporeæ are well represented in Australia. The Pittosporum is a genus of very handsome evergreens, either as tender shrubs or small and slender trees. It is one of the rare scented class of plants seen in Australia. The flowers of *Pittosporum undulatum,* which is known as the Victorian laurel, and of *Pittosporum rhombifolium,* yield a perfume which is as rich and delicate as that of the Jasmine. Their timber is also of high commercial value. *Pittosporum phillyrœoides* is said to be one of the most graceful members of South Australian flora. Its existence in sterile places, often a solitary entity in a barren plain, affords an illustration of how trees grow in even the most neglected spots and flourish in foliage and flowers. Of the Proteaceæ, *Stenocarpus sinnuatus,* which is known as the Queensland Tulip tree, is a very handsome tree, often reaching the height of a hundred feet. Its flowers are beautifully scarlet and radiately arranged in thick clusters. I saw this tree in blossom in February in the Sydney Botanical Gardens. Its wood is beautifully grained and very durable, says Mr. Guilfoyle. *Greville robusta,* a tree introduced into Bombay, is a native of Australia. I have seen it for years growing here. But it does not appear to be so quick of growth as in its own home. It is called the "Silky Oak." It is productive of substantial timber, well worthy of the consideration of our foresters, apart from the highly perfumed yellow and orange comb-shaped masses of flowers it produces. It often grows as high as a hundred feet. *Banksia,* or the Victorian Honeysuckle, and *Hakea,* are some of the other representatives of the Proteaceæ. They have numerous species all over the island continent. They inhabit sandy soil, or are utilized as hedge plants. Their quaint flowers, in cylindrical dense spikes and seed vessel, are their sole points of interest. *Xylomelum pyriform,* or the Wooden Pear of Australia, belongs to this order. You are, perhaps, imagining that this Wooden Pear is in any way allied to the soft delicious pear which is the postprandial luxury of an English table. Nothing like it, except in the bare shape. The Wooden Pear is as different from the reality as the betelnut is from the cherry. I have a specimen of it here. It is a typical specimen of a simple fruit formed of one carpel. It has a beautifully winged seed, which can be seen through the half-dehisced carpel. There are two representatives of the Sterculaceæ, *viz.*, the Flame tree and the Bottle tree, which are worthy of notice. The Bottle tree is botanically either the plant called *Sterculia diversifolia*, or *Sterculia rupestris*, and is really the wonder of Australia. It is swollen at the trunk immediately above the root, as it springs from the ground, in the shape of a pumpkin or bottle, and is known to the natives as *Kurra jong*, a name given to another plant. The tree contains large quantities of mucilage, which exists between the wood and inner bark, and is sweet and edible. It is a blessing to men as well as to cattle, as it is found to be nutritious. The latter use it when pasture fails as fodder. "The bark," says Guilfoyle, "when macerated in water produces a lace-like bast, which has been converted into ropes, cordage, and coarse paper." The Australian Flame-tree, *Sterculia acerifolium*, may be considered a forest beauty when in full blossom. Before it blossoms it sheds its leaves. When the flowers open on its numerous irregularly shaped branches, its stately stem is adorned from top to foot with rich scarlet trumpet-shaped flowers, with a tinge of bright orange here and there, which gives the beautiful tree the appearance of being all aflame. The appearance is very similar to that of our own Palas or *Butea frondosa* in the Konkan when it is in flower. Australia is rich in Orchids, both terrestrial and epiphytal. Mr. Fitzgerald, of Sydney, has made a special study of them, and I here exhibit his beautful plates, which are the result of the earnest life-work of an accomplished botanist and artist. Some of the orchids are said to be of exceedingly attractive fragrance, as, for instance, Thelymitra and Caladenia. Let me not forget to mention that the sweetest scented Australian flower belongs to the natural order Rutaceæ, and is called *Boronia megastigma*, a native of Western Australia. What a contrast to the horribly offensive Satap (*Ruta angustifolia*) of the same order! The genus Boronia is well represented in the Victorian indigenous flora, in the species named *B. pinnata*, bearing beautful crimson flowers; but the other species are chiefly confined to the Western Coast and New South Wales. The Tree-Ferns form a specially interesting feature of Australian vegetation, generally varying from twenty to thirty feet, and often attaining a height over eighty feet. There is not a prettier sight in Victoria, and indeed the whole of Australasia, than what are called the Fern-gullies, which abound in these beautiful feathery palm-like ferns, waving their fronds in mid-air with all the gorgeous green a mild sky and moderately humid air engenders. *Dicksonia antartica* and *Alsophila Australis* are the two most common varieties of Tree-Ferns in Victoria. The former grows in shady places where there is abundance of running water, and is known as the Woolly tree-fern; the latter is called the mountain or hill tree-fern, and is seen in more open spaces, such as the ridges of hills, where it displays its beautiful fronds to the sun direct. *Todea barbara* is another remarkable fern which attracts our attention in the fern-gullies of Victoria. It seldom grows more than four or five feet high, and has a short thick stem about as many feet in circumference, frequently weighing as many as fourteen or fifteen hundredweights! About the end of January last, in the hottest time of the year in Australia, I paid a visit to Fernshaw, one of the prettiest *fern-gullies*—I should say one of the prettiest and yet grandest *fern-forests* of Victoria. It was one mass of delicious gorgeous green with the shady beech and the blue gum towering in mid-air, the lovely silver wattle, the modest musk, and the stately cotton-wood—the largest composite ever seen anywhere, adding to the scene a variety of foliage, thus making it all the more attractive to the eye, and heightening the effect of the valley as a whole. All these trees fringing and filling fully the magnificent hill from the Black Spur at the top to the crystal pool at the foot of the valley, set off the emerald fronds of the Woolly tree-fern (*Dicksonia*) in the most striking manner. The stream of water is perennial, crystal clear to the eye, cool to the touch, and delicious to the taste. Its perpetual music imparts a softness to the sylvan solitude, which else might be awful; its constant fresh accession of undefiled water to the valley enlivens the scene and brightens its velvet-verdure, which constitutes the sole charm of this happy and secluded valley within easy reach of Victorian travellers. In walking through this beautiful sequestered spot, damp and covered with dead and decaying foliage, the traveller must take care that his lower extremities do not get attacked by minute leeches, whose hair-like bodies often escape the unsuspecting eye and even elude the cautiousness of the wary wanderer of these quiet regions. The Dicksonia has its own parasites and epiphytes in the shape of numerous fungi, mosses, club mosses, and smaller ferns, among which latter *Polypodium scandens* and *Hymenophyllum, Tunbridgense,* are prominent. It may be mentioned that in the gardens of Australia the *Magnolia grandiflora* and the *Lilium grandiflorum* flower and thrive to perfection, though only introduced recently into the Island continent. The purple variety of the Magnolia is a garden beauty. With its rich golden crowns of flowers, rendered all the more visible by the purple tint of the large widely open petals, the plant is strikingly attractive.

(*To be continued.*)

MISCELLANEOUS.

TWO CURIOUS INSTANCES OF MIMICRY.

Two remarkable instances of mimicry have come under my notice within the last few weeks, one by a bird, the other in an insect. I will give them in the order in which I have mentioned them.

At p. 150 of the 4th vol. of this Journal, Mr. Morris published an account of a talking "Madras Bulbul" (*Pycnonotus hæmorrhous*), which in captivity learned to talk by mimicing a parrot with which it associated. A few days before the meeting of the Society at which that paper was read by the Honorary Secretary, I happened to pass his house, and in a small acacia tree in his compound, which overhangs the road about 10 yards below his lower gate, I heard the well-known note of the "Coppersmith" (*Xantholæma Indica*), but though the leaves were so small and scanty that I could see through the tree on all sides, the only bird I could see in it was a Madras bulbul, who on my looking up greeted me with his usual chuckle. I called to mind the well-known powers of concealment enjoyed by the coppersmith, and his ventriloquial skill. But seeing how ill-adapted his present perch was for the successful employment of his usual artifices, I determined this once at least to circumvent them. As I approached the tree I heard the coppersmith and the bulbul apparently conducting an animated dialogue, in which the "took-took" of the one was spiritedly answered by the "chuckle-chuck" of the other. Still I could see only the bulbul. It was raining slightly, and that reminded me that it was an unusual time of the year for the coppersmith to be so loud and persistent in his call, for the "took-took," so familiar during the hot weather, generally becomes less frequent and more feeble during the rains. I got close under the tree, and though I could see every twig in it, and there was the bulbul hopping about, and chuckling, some four feet from my head, and though the coppersmith still kept vociferating "took-took," apparently just behind him, yet not a feather could I see of any bird but the bulbul. Determined to have a sight of the coppersmith that was hiding itself so cleverly, I threw up a good sized stone into the tree, when out flew—the bulbul alone with a derisive chuckle, into the opposite garden, where I presently heard the dialogue going on again as if it had never been interrupted.

In the instance of the Madras bulbul recorded by Mr. Morris, the mimicry was the result of education. The instance of mimicry by a wild bird which Mr. Aitken gave at page 30 of the 1st volume of this Journal was by the allied but perfectly distinct "green bulbul" (*Phyllornis Malabaricus* or *Jerdoni*). I have not before heard of an instance of a wild Madras bulbul imitating the natural notes of his jungle associates. But that *Pycnonotus hæmorrhous* has the faculty of mimicry is clear from Mr. Morris's paper. As in his instance the development of that faculty was apparently induced by the effort to repeat the constantly reiterated utterances of a companion bird, so in mine it would seem that the note incessantly sounded by a neighbour all through the hot weather had taken such a hold of the bulbul's mind that he was driven almost unconsciously to repeat it. The maddening monotony of that "took-took" keeping him awake after tiffin on hot Sunday afternoons may well have so acted on the poor bulbul's nerves or brain as to drive him to emit a similar sound, and it is hard to see for what other reason he should have attempted it in a wild state, with none to instruct or applaud him, and with a far more pleasing note of his own.

My second instance of mimicry must be of very frequent occurrence, for it is one of natural protective mimicry in the life history of every individual larva and pupa of a common species of butterfly. But as I have never yet seen any description of it, I think it may possibly not yet have come under the observation of any entomologist, and as it is certainly curious and interesting, I venture to offer a description of it.

On the 1st August I found on the leaves of a sweet lime tree in my garden four small caterpillars lately hatched. Feeding, as they did, on the upper side of the leaf, they were of course fully exposed to the sight of every passing bird. Being moreover of slow and sluggish habits, these caterpillars, so exposed to the sight of their enemies, were driven to artifice to elude their observation. They adopted the unsavoury one of pretending to be bird-droppings. In every instance the imitation was so exact that at the distance of a foot and a half I found it impossible to tell the caterpillar from a bit of the solid excrement of some small bird. It was bluntly rounded at the head end, tapering rather suddenly towards the tail, of a dark gray colour, with an irregular broadish band of dirty white running diagonally across the body. It retained this appearance so long as it remained of a size to carry on the deception successfully, but when about ¾ in. in length, and too large to hope to be any longer mistaken for what it at first pretended to be, it began to imitate the tree on which it was feeding. Here again the imitation was most exact. The back arched up, like a folded leaf. The dark gray turned to the dark green of the foliage, and the single broad white band became two much contracted markings of brown delicately streaked with yellow, like the bark of the twigs, while a still narrower line of the same appeared transversely across the back, just above the head. The green continued to expand and the brown to contract, till the caterpillar was about an inch and a half in length, when it was of a beautiful shaded green all over its upper side, and pink to ash colour beneath. It then attached itself firmly by the tail end to a twig with its head upwards, at an angle of about 30°, steadied itself by two almost invisible gossamer threads from its head to another twig above, and in that position assumed its chrysalis form in the shape of a curved green leaf, which it imitated so exactly that I had some difficulty in finding it in the sprig in which I knew it to be.

The first of these larvæ to assume the pupa form did so on the 9th August. Two others when on the point of following its example a few days later, unfortunately developed suicidal tendencies, and drowned themselves in the water in which the stalks of their lime sprigs were immersed. The fourth assumed the chrysalis form on the 28th August. The one who entered on his pupa-hood on the 11th August emerged a perfect imago on the 20th, a male of the species *Papilio Pammon.* Despite the habits acquired in youth, it would appear that his long course of deception then ended, for he was like nothing else that I know. But, had *he* been *she,* it would have continued to the end of life. For, whether it is to protect herself from the attacks of some voracious foe with a special liking for the flavour of *Papilio Pammon,* or from a feminine vanity which leads her to prefer the brilliant colours of other species to the sober-suited livery affected by the males of her own, or owing to the natural duplicity of the wily sex born to deceive, or only because Mr. P. likes to see his wife brightly dressed, I know not (I hope the last is the true reason), yet certain it is, as pointed out by Col. Swinhoe in an interesting lecture on Mimicry in Butterflies for Protection, printed at p. 169 of the 2nd vol. of this Journal, "the female of *Papilio Pammon* mimics two species, *Papilio Diphilus* and *Papilio Hector.*" Which of these, if either, will be mimicked by the imago I expect to result from my now sole surviving pupa, I am anxiously waiting to see.*

W. E. HART.

Bombay, 29th Aug. 1889.

* The imago appeared on 7th September, a female of the Diphilus type.

ZOOLOGICAL NOTES.

In the month of June 1888, I was standing one morning in the porch of my house, when my attention was attracted by a large dragon-fly of a metallic blue colour, about 2½ inches long, and with an extremely neat figure, who was cruising backwards and forwards in the porch in an earnest manner that seemed to show he had some special object in view. Suddenly he alighted at the entrance of a small hole in the gravel, and began to dig vigorously, sending the dust in small showers behind him. I watched him with great attention, and, after the lapse of about half a minute, when the dragon-fly was head and shoulders down the hole, a large and very fat cricket emerged like a bolted rabbit, and sprang several feet into the air. Then ensued a brisk contest of bounds and darts, the cricket springing from side to side and up and down, and the dragon-fly darting at him the moment he alighted. It was long odds on the dragon-fly for the cricket was too fat to last, and his springs became slower and lower, till at last his enemy succeeded in pinning him by the neck. He appeared to bite the cricket, who, after a struggle or two, turned over on his back and lay motionless, either dead, or temporarily senseless. The dragon-fly then, without any hesitation, seized him by the hind legs, dragged him rapidly to the hole out of which he had dug him, entered himself, and pulled the cricket in after him, and then, emerging, scratched some sand over the hole and flew away. Time for the whole transaction, say, three minutes.

The cricket was of the large fat kind that keep up a continual singing in a tree or house porch. The noise is peculiar, as it is difficult to tell from what spot it comes, and it sometimes has almost a deafening effect on the ears if listened to for some time. I have most frequently heard these crickets in hill jungles in the hot weather, but I do not know their scientific name.

I do not find any mention of a dragon-fly such as I describe in "Tribes on my Frontier," nor have I ever heard of a case in which a large cricket was dug out of his home, only to be killed and then buried in it. But was it his home? or was it the home of the dragon-fly into which he had got by mistake? If the former, why did the dragon-fly put him back again? or, if the latter, why did the cricket ever go into the house of so formidable an enemy? I conclude that the cricket was in his own home, and, in that case Irish evictions and moonlighters are nothing to what he had to endure, for he was first evicted, then chased and killed, and then buried beneath his own hearth-stone.

In any case the sight was a most curious one, and I should be glad to have a scientific explanation of it.

E. GILES.

CORRESPONDENCE.

WILD BUFFALO.

To the Editor, Bombay Natural History Society's Journal.

DEAR SIR,—Mr. Littledale's derivation (*see* Journal No. 2, page 153,) is ingenious even if it is not quite correct.

I think, as far as I can gather, the word "Urnah" not "Arna" comes down from Assam and those parts, and is not Hindustani at all. My authority for this is Baldwyn, who frequently uses the word "urnah" as if it were in common use in the parts of which he is writing, *viz.*, Jeypore and the Lowqua lake.

I was this year in the Central Provinces, and came across several herds of buffalo. The natives, however, did not even understand the word "Arna" or "Urnah," but called them indifferently with the bison "Bim bhainsa," "Jungle bhainsa," and the Gonds "Pera Mao." The word "Gaur," whenever used, of course referred to "Garæus Gaurus," which were to be found in the same jungles.

In Sind and the Punjab the word "darkhat" for "darakht" is not uncommon, as well as many other Provincialisms, as "nuggeech" for "nuzdeekh" (near). "Nuklau" for "Luknau." In the Central Provinces the town of Warora is called by every one there Baroda."—I am, &c.,

W. ST. JOHN RICHARDSON,

Capt. B. S. C.

PROCEEDINGS OF THE SOCIETY.

Proceedings of the Meeting held on 10th July 1889.

The usual monthly meeting of this Society took place on Wednesday, the 10th July 1889, and was very largely attended, about 80 members being present. Dr. G. A. Maconachie presided.

The following gentlemen were elected members of the Society:—Lieut. R P. Monk, Mr. V. B. F. Bayley, Miss Macdonald, M.D., Mr. George K. Wasey, Mr. H. C. Wright, Mr. H. M. Gibbs, Capt. G. M. Porter, R.E., Mr. T. E. Lovell, Lieut. W. S. Mangles, Mr. Ruttonji T. Furdunji Parak, Mr. Anthony P. Menezes, Capt. G. E. Hyde-Cates, Mr. I. O'Callaghan.

Mr. H. M. Phipson, the Honorary Secretary, then acknowledged the following contributions to the Society's Museum:—

CONTRIBUTIONS DURING MAY AND JUNE.

Contributions.	Description.	Contributor.
1 Chameleon (alive)	Chameleo vulgaris	Mrs. Aston.
1 Common Kangaroo	Macropus major	By exchange, thro' Dr. Kirtikar, with the Melborne Museum.
2 Red Kangaroos	Osphranter rufus	
1 Duck-billed Platypus	Ornithorhynchus paradoxurus.	
1 Vampire Bat	Pteropus poliocephalus	
1 Ring-tailed Opossum	Phalangista viverina	
2 Sooty Kangaroos	Macropus fuliginosus	
1 Victorian Wombat	Phascolomys platyrhinus	
1 Porcupine Ant Eater	Echidna hystrix	
123 Stuffed Birds	Australian	
99 Beetles	Australian	
3 Whydah Birds (alive)	Embrezia paradisea	Mrs. Skinner.
A number of Waxbills (alive)	From Mozambique	Do.
4 Robber Crabs (alive)	Birgus latro	Mr. H. W. Searle.
4 Young Turtles (alive)	Chelonia virgata	Do.
2 Coral Sponges	Carteris-spongia lammelosa.	Capt. Carpenter, R.N.
3 Chameleons (alive)	Chameleo vulgaris	Capt. G. E. Briggs.
A quantity of Bats	From Carwar	Mr. E. H. Aitken.
A Black Bear (alive)	Ursus labiatus	Capt. Coleridge.
1 Crow's Nest	Made of Telegraph Wire	Mr. E. H. Elsworthy.
Crabs from the Orissa Coast.	Hippa asiatica	Dr. Alcock.
10 Young Crocodiles (alive)	Crocodilus palustris	Mr. E. C. K. Ollivant, C.S.
A number of Crocodiles' Eggs.		Do.
1 Snake	Dipsas ceylonensis	Col. F. W. Major.
1 Kingfisher	Alcedo bengalensis	Mrs. Middleton.
1 Pied Cuckoo	Coccystes jacobinus	Do.
1 Young Crocodile	Crocodilus palustris	Mr. Rustomjee Hormarjee.
3 Bird-Eating Spiders	Mygale sp.	Rev. J. Mayr, S.J.
1 Tree Snake (alive)	Passerita mycterizans	Rev. F. Dreckmann, S.J.
1 Panther Cub (alive)	Felis pardus	Mr. J. D. Inverarity.
1 Young Crocodile	From Asirgurh	Mr, R. H. Light.
1 Chameleon (alive)	From Aden	Dr. Monks.
A quantity of Insects	From Raipore, C. P.	Mr. J. A. Betham.
1 Coppersmith's Nest	Xantholœma hæmacephala.	Mr. Charles Douglas.
1 Chameleon (alive)	Chameleo vulgaris	Shrivlal Motiram, Khan Saheb.
1 Sea Snake (alive)	Pelamis bicolor	Mr. A. Abercrombie.
1 Snake	Ptyas mucosus	Mr. J. Warden.

Contributions.	Description.	Contributor.
1 Toddy Cat (alive)........	Paradoxurus musanga	Mr. H. E. James, C S.
1 Japanese Spider-Crab ...	Inachus kæmpferi...........	Purchased.
1 Snow Panther's Skull and Skin.	Felis uncia	Do.
A quantity of Corals, Fish, and Marine Animals.	From Alibag.....................	Mr. W. F. Sinclair, C.S.
1 Panther's Skull	Felis pardus	Do.
1 Bullfinch (alive)	From Yokohama..............	Capt. Nantes.

MINOR CONTRIBUTIONS FROM

Mr. A. Abercrombie, Mr. W. E. Hart, Miss Keller, Captain J. F. C. Thatcher, Mr. J. W. Brown, Mr. H. W. Uloth, Mr. W. W. Squire, and Mr. A. McLaren.

EXHIBITS.

A curiously deformed sambhur horn, picked up near Baroda, by Mr. H. Littledale.

A cutaneous horn grown on a camel's head, by Mr. W. Home, of Jodhpore.

A water-coloured drawing of camels (the Society's Prize Picture at the late Art Exhibition), by Mrs. Scott.

CONTRIBUTIONS TO THE LIBRARY.

Name.	Presented by
Zoology of Victoria, Decades I. to XVII.	Dr. Kirtikar.
Geological Survey of Victoria Reports..	Do.
Manual of New Zealand : Coleoptera. Parts II. to IV.	Do.
Manual of the New Zealand Mollusca	Do.
Manual of the Birds of New Zealand	Do.
Manual of the Fishes of New Zealand	Do.
Catalogue of the Moths of India (Swinhoe and Cotes)..................	From Government.
Report of the Geological Survey of India, No. XXII., Part 2...........	
Catalogue of Manthodea	Mr. J. Wood-Mason.

THE SOCIETY'S JOURNAL.

The Honorary Secretary said that the first two numbers of the Society's Journal were in the Press, but that their publication had been delayed owing to the non-receipt of the coloured lithographed plates from Messrs. Mintern Bros., London.

MANGO WEEVILS.

The Honorary Secretary stated that if any of the members wished for further information respecting the small beetles (*Cryptorhynchus mangiferæ*) found in mango stones, regarding which several letters had appeared in the newspapers, they would find a full account of the insect in Mr. Simmons' pamphlet in the Society's Library.

PROPOSED ZOOLOGICAL GARDEN.

Mr. H. M. Phipson reminded those present that twelve months had now elapsed since the Bombay Natural History Society had offered to start a zoological garden, provided a suitable site could be obtained. The sum of Rs. 55,000 had been subscribed in a very short time amongst the members and their friends, but the scheme fell through, owing to the refusal of Government to give the Society the use of the required site. The only satisfaction now left to the Society was that their action had drawn public attention to the importance of the subject, and the result was that the Bombay Municipality had sanctioned the Commissioner's proposal to improve and enlarge the existing collection of animals at the Victoria Gardens. Mr. E. C. K. Ollivant, the Municipal Commissioner, was taking a keen interest in the subject, and had asked the Bombay Natural History Society to assist him by appointing a sub-committee to visit the Gardens once a week, and to consult with him as to the best means of forming a zoological collection which would be a credit to the city. Mr. Phipson hoped the gentlemen who had offered donations a year ago towards the cost of cages, houses, &c., (to be named after them) would renew those offers, now that the Society had determined to help the Commissioner to carry through his scheme.

The following Papers were then read :—

NOTE ON A TALKING BULBUL.

(By Mr. A. W. Morris, F.Z.S.)

Which appeared in No. 2 (Vol. IV.) of this Society's Journal.

"OUR HYMENOPTERA."

(By Mr. Robert C. Wroughton.)

The Honorary Secretary read extracts from this very interesting paper, which he stated would appear in the course of a few days, in the Society's Journal, when it could be studied and enjoyed by the members at leisure. A vote of thanks was passed to Mr. Wroughton for his paper and for the collection of ants, bees, and wasps he had made for the Society.

Mr. J. H. Steel, A.V.D., then read a valuable paper on "The Camel," which will be found on page 207 of this volume.

PROCEEDINGS OF THE SOCIETY'S MEETING ON 10th AUGUST 1889.

THE usual monthly meeting of the Members of this Society took place on Wednesday, the 7th August 1889, Dr. D. MacDonald presiding.

The following new members were elected :—Mr. T. E. Sansom (of Batavia), Mr. E. H. Elsworthy, Mr. James Jardine, Rev. Goldwyer Lewis, Mr. H. Couldrey, Mr. S. Carleton, Mr. A. Murray, Mr. Wm. Tudball, B. C. S., Mr. Chas. Tudball, C. E., and Mr. G. R. Lynn.

Mr. H. M. Phipson, the Honorary Secretary, then acknowledged the following contributions to the Society's Museum :—

CONTRIBUTIONS DURING JULY.

Contribution.	Description.	Contributor.
1 Toddy cat (alive)......	Paradoxurus musanga.	Mr. E. J. Ebden, C. S.
1 Snake (alive)	Tropidonotus quincunctiatus.	Mr. X. Casteli.
2 Snakes	Python molurus, dendrophis picta.	Mr. H. E. M. James, C. S.
Nest and Eggs of	Common Wren Warbler.	Mr. E. P. Close.
3 Floricans' Eggs	Sypheotides aurita	Do.
1 Purple Coot (alive)	Porphyris poliocephalus	By exchange.
1 Tailor Bird's nest	Ortuotomus sutorius	Mr. S. Luard.
1 Snake (alive)	Dipsas gokool	Do.
1 Lizard (alive)	Gymnodactylus Sp.	Mr. G. K. Wasey.

CONTRIBUTIONS TO THE LIBRARY.

The Moths of India (Swinhoe and Cotes); from the authors.

Reports of the Geological Explorations in New Zealand; in exchange.

Proceedings of the Linnæan Society of N. S. Wales; in exchange.

Proceedings of the New Zealand Institute; in exchange.

Annali del Museo Civico do Genova; in exchange.

Verhandlungen der zoologisch botanischen Gesellschaft (Vienna); in exchange.

The Journal of the Asiatic Society of Bengal, Part II., No. 1; in exchange.

A VALUABLE ADDITION.

The Honorary Secretary drew attention to the magnificent pair of bison's horns which the Society had been able to secure through the kind assistance of Mr. C. J. Maltby, of Peermaad, N. Travancore. The horns, which were greatly admired by every one present, measure no less than 43 inches across (utmost span). A cordial vote of thanks was passed to Mr. Maltby for his services rendered to the Society.

EXHIBITS.

Mr. J. Lyons exhibited a live specimen of the *Thick-tailed Galago* (Galago craas audatus) from the East Coast of Africa. The power which this curious little animal posesses of folding up its membranous ears excited much interest amongst those present who examined it.

Mr. S. Luard exhibited a curious monstrosity of the *Poinciana pulcherrima*, in which the peduncle and rhachis were excessively developed and flattened, being about 1½ inches broad. On the two flattened surfaces the flowers were crowded together, producing a very gorgeous effect. It was decided to give a sketch of this abnormality in the Society's Journal.

Mr. J. H. Steel, A.V.D., made some interesting remarks on a guinea-worm which had been received from Dr. C. Mallins of Hingoli, which appeared to differ in some important respects from the true dracunculus.

A BEAR EATEN BY A TIGER.

Some interesting sporting notes by Professor Littledale, of Baroda, were read, amongst which was a singular account of a bear having been killed and eaten by a tiger.

NEW RULES.

The new rules which had been drawn up by the Committee were adopted, and it was further decided that a copy of the same should be sent to every member of the Society.

THE SOCIETY'S PRIZE AT THE BOMBAY ART EXHIBITION.

Mr. Phipson reminded the members that last year the Bombay Natural History Society offered a prize of Rs. 100 for the best painting of animals at the Bombay Art Society's Exhibition. The prize was eagerly competed for, and produced a large number of interesting pictures at the Exhibition which was held in February last. The Honorary Secretary proposed that the Bombay Natural History Society should repeat their offer of this prize at the Exhibition next cold weather—a suggestion which was unanimously agreed to.

The Honorary Secretary read an amusing paper by Mr. E. H. Aitken, entitled "The Red Ant," which appeared in No. 2, Vol. IV. of the Society's Journal.

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Natural History Society

No. 4.] BOMBAY, 1889. [Vol. IV.

NESTING IN WESTERN INDIA.

(*Continued from p.* 98.)

342.—THE MALABAR WHISTLING THRUSH.

Myiophoneus horsfieldi, Vig.

The Malabar Whistling Thrush, or Idle Schoolboy, is not uncommon on the Ghâts, confining itself to the wooded ravines and nullahs on the hill sides. It occurs but very rarely at Aboo. It is a permanent resident, commencing to breed about June; the nest, which is a very large one, is generally found close to water; * it is composed of fine sticks, roots, grass, moss, &c., having a good deal of earth mixed with it, especially at the bottom.

The eggs, four in number, are broad ovals, slightly pinched in at one end, measuring 1·22 inches in length, by about 0·95 in breadth.

In colour they are pinkish- or greyish-white, thickly speckled and spotted with pinkish-brown.

They breed very commonly at Poorundhur, near Poona, where they are known as Hill Blue Birds.

Khandalla, 5th June. *H. E. Barnes.*
Saptashring Nassick, July. *J. Davidson, C. S.*

345.—THE YELLOW-BREASTED GROUND THRUSH.

Pitta brachyura, Linn.

The Indian or Yellow-breasted Ground Thrush has not been recorded from Sind; it occurs sparingly at and around Deesa, but becomes more common further south and east. In most of these places it occurs merely as a passing visitor, but some few remain to breed at suitable places on the Ghâts; the nest is a clumsy-looking structure, with an entrance on one side, composed of dead leaves, grass, and fine twigs, lined with finer grass and leaves.

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* Mr. Davidson ,C.S., has often found them in the faces of tremendous cliffs.

It is usually placed in a bush or low tree, occasionally on the ground; the eggs, four or five in number, are broad oval in shape, measuring an inch in length by rather more than 0·85 in breadth; in colour they are a beautiful glossy china-white, with deep maroon and purplish spots, streaks, and hair lines, denser towards the larger end, where they often form a zone or cap; occasionally the lines are absent, and the egg is merely speckled finely at the larger end with maroon and pale lilac.

Khondabhari Ghât, Khandesh, July.	*J. Davidson, C.S.*
Dangs, Nassick, June,	*Do.*
Coast, Kanara, June.	*Do.*
Khandalla, June (nest only).	*H. E. Barnes.*
Saugor, C. P., July.	*Do.*

354.—THE WHITE-WINGED GROUND THRUSH.

Geocichla cyanotis, Jard.

The White-winged Ground Thrush is a permanent resident all along the Sahyadri Range, common in the south, but becoming much less so further north. It breeds early in the rains, making a cup-shaped nest of grass-roots and twigs, with which a great deal of earth is incorporated; it is usually placed in a fork in a tree, at no great height from the ground. The eggs, three or four in number, vary a good deal both in size and colour. The usual type has a very pale green ground colour, spotted and speckled with various shades of reddish-brown; occasionally the ground colour is pale olive-green and sometimes of a pale fawn. They measure one inch in length by nearly 0·72 in breadth.

Khandalla, June,	*H. E. Barnes.*
Khondabhari Ghât, Khandesh, July & August.	*J. Davidson, C.S.*
Dangs, Nassick, June.	*Do.*

359.—THE BLACK-CAPPED BLACKBIRD.

Merula nigropilea Lafr.

The Blackbird does not occur in Sind, is rare at Mount Aboo, and in Khandesh occurs only as a straggler, but in the Ghât parts of Nassick, (elsewhere unknown) during the rains, it is very common. Mr. Davidson is of opinion that they arrive in the latter district about the beginning of May, and leave at the end of the rains, after breeding, some few birds remaining later. In Ratnagiri it appears to be a fairly common permanent resident. They breed during the rains, on trees and bushes, at all heights from the ground, from four to twenty feet. The nests, composed of green moss and twigs, are of the usual blackbird type, and are large and rather clumsy. The eggs, three or four in number, (generally three), are oval in shape, pinched in at one end, measuring 1·1 inches in length by about 0·9 in breadth; in colour they are greenish-white, boldly blotched with various shades of bright reddish-brown, with an occassional underlying cloud of faint inky-purple. The markings are usually most dense at the larger end, where they often form an irregular cap. Some of them resemble eggs of the Missel Thrush.

Mr. Davidson, C.S., obtained a great number of eggs from Saptashring, Nassick. I found a half-finished nest at Aboo in June, but had to leave the hill before the eggs were laid, and a nest containing three slightly incubated eggs at Khandalla in July. I have received the eggs from the Pachmari Hills, in the Central Provinces.

Saptashring & Ghâts, Nassick, June & July.	*J. Davidson, C.S.*
Khandalla, July.	*H. E. Barnes.*
Aboo (nest only) June.	*Do.*

385.—THE YELLOW-EYED BABBLER.

Pyctoris sinensis, Gm.

The Yellow-eyed Babbler occurs more or less commonly throughout Western India, breeding during the rains, making typically a solid, compact, cone-shaped nest (often broadly truncated), with the apex downwards. It is composed of broad blades of grass, neatly lined with fine grass roots and stems, coated on the exterior with spider webs.

It is usually placed in a slender fork in a small tree or bush, sometimes between the upright stems of reeds, &c. I have never found the nest on a Banyan tree, as stated by Jerdon, on the authority of Mr. Phillips.

The eggs, four or five in number, vary much in colour; one type (the commonest) has the ground colour a delicate pinkish-white, thickly freckled with specks of brick-red; another, the same colour, but with the ground markings consisting of blotches and streaks of bright blood- and brick-red boldly defined, and having an occasional underlying cloud of pale inky-purple. Sometimes the ground colour is nearly white; between these extremes every possible combination occurs.

It may have been a mere coincidence, but all the eggs I took in Sind (and I took a great number) were of the first mentioned type.

The eggs are broad oval in shape, and average 0 73 inches in length by about 0·59 in breadth. They have a high gloss.

386*ter*.—THE GREY-THROATED BABBLER.

Pyctoris griseogularis, Hume.

The Grey-throated Babbler is said to be a permanent resident in Sind, but I am not aware of the nest having been taken.

389.—THE NILGIRI QUAKER THRUSH.

Alcippe poiocephala Jerd.

Mr. Davidson, who has afforded me much valuable assistance in compiling this paper, has furnished me with this and the following note :—

" This bird is very common at Matheran, and all through the Ghâts, from the south of Kanara to the extreme north, where they end in Khandesh. It builds a neat nest, somewhat of the bulbul type, and generally conceals it among some thick branches, a favourite place being among some climbing plant which has twisted itself among the branches of a thick tree. The nest is generally about ten to fifteen feet from the ground, but is sometimes within reach. The eggs, three in number, are very beautiful."

In shape they are moderately broad ovals, somewhat compressed at one end, and have a fine and rather glossy shell. The ground colour is a delicate pink. There are a few pretty large and conspicuous spots and hair lines of deep brownish-red, almost black, and there are a few large pinkish-brown smears and clouds, generally lying around or about the dark spots ; and then towards the large end, there are several small clouds and patches of faint inky purple which appear to underlie the other markings.—(*Nests and Eggs of Indian Birds, p.* 241.) As is usually the case with highly-coloured eggs, they subject to much variation in colour and markings some taken by Mr. W. Davison are described as being of a beautiful reddish-pink, blotched and streaked with reddish carmine.

390.—THE BLACK-HEADED QUAKER THRUSH.

Alcippe atriceps, Jerd.

"This brisk little bird is very common in the jungles of Kanara from the sea-level to the full height of the Ghâts and also in the jungles above, wherever there is any bamboo jungle. They go about in small parties or pairs, and seem in a chronic state of building nests. Indeed, I have watched the birds building frequently during the hot weather and early rains. I do not think the nests are for incubation as a rule, but that after the nesting season is over, the family always roost in a nest. For some reason or another they soon get tired of their nest, and six or seven are generally to be found close to one another. They are large masses of bamboo leaves with (in the cases of new ones) a hollow inside lined with fine grass; generally (but not always) opening from the top.

"The only nest I have taken with eggs was in the middle of June at Karwar, but an egg undoubtedly of this bird was brought me in April from the crest of the Ghâts. The eggs are large for so small a bird, and are of a pale pinkish-white colour, boldly spotted at the larger end with deep brick-red. There were two fresh eggs in the nest I found."

397.—THE RUFOUS-BELLIED BABBLER.

Dumetia hyperythra, Frankl.

This little Babbler has been recorded from the Konkan and Khandesh, and from the Vindhian Hills, near Mhow. Mr. Wenden found them breeding at Tanna and at Khandalla during the rains; the nest is globular in shape, composed of coarse grass blades, sparingly lined with fine grass. It is frequently placed on the ground amongst coarse grass, or dead leaves, with which it is not infrequently incorporated; occasionally it is found in low scrub bushes only a foot or so from the ground.

The eggs, four in number, are broad oval in shape, white in colour, spotted, speckled, streaked, and blotched with brownish-red and reddish-purple; the markings are sometimes clearly defined, at others they are smudgy, in others again they are speckly. They measure 0·67 inches in length by about 0·53 in breadth.

The birds are very commen at Saugor, breeding during July and August.

398.—THE WHITE-THROATED WREN BABBLER.

Dumetia albogularis, Blyth.

The White-throated Wren Babbler is much more generally distributed in Western India than I once thought. It occurs all along the Sahyadri range, is not uncommon at Mount Aboo, is fairly common at and in the vicinity of Baroda, and I myself have found it breeding on the slopes under the cliffs, at Sion, near Bombay.

It is a permanent resident at all these places, and breeds at the end of the hot weather and during the early part of the monsoon.

The nest is globular in shape, having the entrance near the top, and is composed of broad-leaved grasses and sedges, and is placed on the ground, occasionally in low bushes.

The eggs, usually four in number, are oval in shape, pinched in a little at one end, and measure 0·73 inches in length by about 0·51 in breadth. The ground colour is china-white (sometimes pinkish-white), freckled and spotted with bright red; the markings are usually much denser at the larger end, where they often form a cap or zone, and having an occasional spot of lilac or clayey-brown intermingled.

Mr. Davidson, C.S., took a nest towards the end of May, containing seven eggs, but as they belonged to two distinct types, and as he, after waiting a short time, saw three birds flitting towards the nest; they were possibly the joint produce of two females.

Sion, near Bombay, 10th May.	*H. E. Barnes.*
Baroda, July and August.	*H. Littledale, B.A.*
Dangs & Hills in Nassick, June and July.	*J. Davidson, C.S.*
Khondabhari Ghât, Khandesh, July & August.	*Do.*
Dhulia, Khandesh, April.	*Do.*

399.THE SPOTTED WREN BABBLER.

Pellorneum ruficeps, Sws.

I have never met with this bird in the flesh, and I am indebted to Mr. J. Davidson for the following note:—"This bird is common in the Kanara jungles, and I have noticed it through all the hill-parts of Nassick. It is, however, about the shyest bird in the jungle, and is often overlooked. It breeds in April and May in Kanara, making its nest on the ground, in thick evergreen jungle, where there is no grass. The nest is a large ball of leaves with the entrance at the side. The number of eggs I have found have always been either two or three, and I have found two eggs, hard set. They are in some respects not unlike a common type of *Thamnobia fulicata*, being greyish-white, thickly mottled with numerous very fine spots of various shades of brownish-purple.

404.—THE SOUTHERN SCIMITAR BABBLER.

Pomatorhinus horsfieldi, Sykes.

As its trivial name implies, this Babbler only occurs in the southern portion of the Presidency on the slopes and at the foot of the Sahyadri Range, where it is stated to be a permanent resident. I can find no authentic record of its nest having been taken within our limits,* but elsewhere they breed from April to May, making a large globular nest of roots, grass, and moss, the moss being principally used as a lining; it is placed on or near the ground, under the shelter afforded by a clump of grass or bush. The eggs, three or five in number, are somewhat elongated ovals in shape, and are smooth spotless white in colour; they measure 1·08 inches in length by about 0·77 in breadth.

404*ter*.—HUME'S SCIMITAR BABBLER.

Pomatorhinus obscurus, Hume.

The differences between this bird and the Southern Scimitar Babbler are slight, and it requires a careful examination to distinguish them from one another. It is very common on Mount Aboo and on the hills in the neighbourhood, and specimens sent to Mr. Hume, from the borders of Khandesh and Nassick, as *horsfideli*, by Mr. Davidson, were identified by the former as this bird. Personally he doubts their distinctness, as also do I. He has taken nests on the Ghâts bordering between Khandesh and Nassick in April. The number of eggs in all cases was two, and the nests seemed to him to be slighter built than the rough nest he has seen of *horsfieldi*.

No Scimitar Babbler of any kind has as yet been recorded from Sind.

I found a nest at Mt. Aboo in the middle of June, nearly completed, but had unfortunately to leave before the eggs were laid.

It was a loose ball of coarse grass, and was placed under a clump of ferns.

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* Since the above was written, Mr. Davidson has informed me that he took a nest in the Varna valley, Satara, in April, containing two fresh eggs.

432.—THE BENGAL BABBLER.

Malacocercus terricolor, Hodgs.

The Bengal Babbler is very common in Sind, and occurs not uncommonly in Guzerat, but becomes rarer further south, where it is replaced by the closely allied Jungle Babbler (*Malacocercus malabaricus*). They are permanent residents where found, breeding from March to July, but occasionally nests are found at other seasons (I took a nest containing four eggs in January); the nests are cup-shaped, and are, as a rule, loosely constructed, but now and then a more carefully-made nest is met with. They are often found in gardens, placed in forks in fruit trees, bushes, thick hedges, vineries, &c. They are composed of grass-roots and stems; the eggs, three or four in number, are broadish oval in shape, but are subject to considerable variation; they measure about an inch in length by 0·78 in breadth; they are of a beautiful greenish-blue color, and are generally highly glossy.

433.—THE WHITE-HEADED BABBLER.

Malacocercus griseus, Lath.

The White-headed Babbler occurs not uncommonly at and near Belgaum, and is common all along the Kanara Coast, and above the Ghâts wherever the country is at all open, but does not appear to come much further north. They breed twice a year, from April to June, and again in October and November; the nest, cup shaped, is composed of fine twigs, grass stems and roots, and is loosely made; it is usually placed in the centre of some small tree or bush; the eggs, three or four in number, are of a deep glossy greenish-blue, quite unspotted. Those in my collection are much deeper in colour than any other Babbler's egg that I am acquainted with, and, although taken many years ago, are still as bright and glossy as at first; they have not, of course, been exposed to the light. Mr. Davidson says: "Eggs of this Babbler I took in Mysore where the palest Babblers I have ever taken, and others I have taken in Kanara are as deep as *malabaricus*."

They measure 0·98 inches in length by about 0·7 in breadth.

Kanara, March & April. *J. Davidson, C.S.*

434.—THE JUNGLE BABBLER.

Malacocercus malabaricus, Jerd.

The Jungle Babbler takes the place of the Bengal Babbler in the southern portion of the Western Presidency.

It is very irregular in its breeding habits (but this trait seems common to the genus); nests have been taken from April to October and occasionally earlier. Both eggs and nests are absolutely identical with those of the Bengal Babbler, *Malacocercus terricolor*.

Mr. Davidson says: "I have taken nests in all the jungle parts of Khandesh (Satpooras and Ghats) in all jungle parts of Nassick, and in Kanara."

435.—THE RUFOUS-TAILED BABBLER.

Malacocercus somervillei, Sykes.

The Rufous-tailed Babbler is much more extensively distributed than is usually thought; Mr. Hume says it is confined to a narrow strip of country, sixty miles north and south of Bombay, but it occurs very much further south than this, and is the common Babbler of the Ratnagiri district.

They breed from June to August, much in the same way as the other Babblers. The eggs, three or four in number, are uniform deep greenish-blue, and in size and shape resemble those of the Bengal Babbler.

Dadur & Sion, near Bombay, June & July. *H. E. Barnes.*

436.—THE LARGE GREY BABBLER.

Argya malcolmi, Sykes.

The Large Grey Babbler is common in the Deccan, fairly common in Rajputana and Guzerat, is very rare in Sind, and appears to be altogether absent from Ratnagiri and the more southern portions of Western India.

They breed more or less the whole year through, but May to July is the season when most nests will be found. The nest, which is a loose cup-shaped structure, composed of fine twigs and grass roots, is generally placed in a fork in a small tree, a babool by preference, at no very great height from the ground. The eggs, three or four in number, are not distinguishable from those of the Bengal Babbler; nests are often found in the trees that border the sides of the roads.

436.—THE RUFOUS BABBLER.

Layardia subrufa, Jerd.

This is another bird concerning the breeding of which little or nothing seems to be known. Mr. Davidson found it to be a permanent resident in the Kanara forests, not at all common and very local. He has never seen its nest.

438.—THE STRIATED BUSH BABBLER.

Chatarrhœa caudata, Dum.

Except in Ratnagiri and the more southern portion of the Presidency, the Striated Bush Babbler is extremely common, breeding more or less the whole year round, making a deep, cup-shaped nest, much more neatly and compactly built than that of any other Babbler I am acquainted with.

It is composed of grass roots and stems, occasionally unlined, but usually well lined with fine grass and hair. The nest is placed in the centre of some low thorny bush, such as a stunted babool.

In Sind, the wild caper bushes that are so common on the hillocks and ridges of wind-blown sand, are generally selected, but even here the babool bushes have their share of nests. The eggs, three or four in number, are longish ovals in shape, and in colour are bright spotless blue or greenish blue. They measure 0·84 inches in length by about 0·63 in breadth.

439.—THE STRIATED REED BABBLER.

Chatarrhœa earlii, Blyth.

Within our limits the Striated Reed Babbler only occurs in suitable places in kind, where it is a permanent resident, breeding from March to September, and having at least two broods in the year. The nest, which is rather massive and cup-shaped, is composed of broad grass leaves and roots, and is placed in close-growing reeds or low bushes. The eggs three or four in number, are bright bluish green in colour, and in shape are longish ovals, somewhat pinched in at one end. They measure 0·96 inches in length by about 0·73 breadth.

Hyderabad, Sind, March to September. *H. E. Barnes.*
Eastern Narra, Sind, March to October. *S. B. Doig, Esq.*

440.—THE STRIATED MARSH BABBLER.

Megalurus palustris, Hors.

Mr. Davidson found this bird in the islands in the Taptee in Khandesh, from November to May, and is certain it bred there. Whether it stayed or not during the rains he does not know; he never found a nest.

Elsewhere they breed during May and June, making a somewhat globular nest with the entrance near the top; it is composed entirely of coarse grass, and is placed in a dense cluster of reeds or grass.

An egg in my collection measures 0·9 inches in length by 0·63 in breadth.

The ground is a dull dead white, thickly speckled and spotted with purplish and blackish-brown.

441.—THE GRASS BABBLER.

Chætornis striatus, Jerd.

The Grass Babbler is not uncommon in Nothern Gujerat and in some parts of Central India. It breeds during the rains, making a roundish nest having the entrance hole near the top. It is composed of dry grass, and is placed on the ground in the centre of a low bush.

The eggs, four in number, are white in colour, speckled all over with reddish-brown and pale lavender. These spots are much more dense at the larger end, where they form a cap.

They much resemble eggs of *Franklinia buchanani*, but are much larger, equalling those of the Striated Bush Babbler.

Deesa, 18th August.	*Capt. Butler.*
Deesa, 4th September (nestlings).	*H. E. Barnes.*

442.—THE BROAD-TAILED REED-BIRD.

Schœnicola platyurus, Jerd.

The Broad-tailed Reed-Bird is very rare. Capt. Butler found it breeding in September at Belgaum. The nests were in long grass by the side of rice fields, but unfortunately he does not describe either the nests or eggs.

443.–THE LONG-TAILED REED-BIRD.

Laticilla burnesi, Blyth.

The Long-tailed Reed-Bird is very numerous in the Eastern Narra District and some other suitable places in Sind, but has not been recorded from any other part of the Western Presidency.

Mr. Doig appears to be the only oologist who has as yet taken the eggs.

He found them breeding in March, June, and September, and describes the nest as being composed of coarse grass lined with fine grass and roots, and measuring four to five inches in diameter externally and two and a half internally, the egg cavity being one and a half inches deep. The nest is placed in the centre of a tussock of grass. The usual number of eggs is three, and they average 0·72 inches in length by about 0·54 in breadth. In colour the eggs vary a great deal, there being two distinct types, one resembling some eggs of the Yellow-throated Sparrow (*Gymnoris flavicollis*), having the ground colour of a pale green covered with large irregular blotches of purplish-brown, and the other having the ground colour very pale cream, with large rusty blotches, which are most numerous at the large end. They desert the nest on the slightest provocation, even after the eggs are laid.

The eggs in my collection, which I owe to the kindness of Mr. Doig, belong to the first-mentioned type.

446.—THE GHÂT BLACK BULBUL.

Hypsipetes ganesa, Sykes.

The Ghât Black Bulbul is stated to occur sparingly on the Sahyadri Range, only as far north as Mahableshwar, but I have received the nest and eggs from Matheran, taken in June, and am almost certain that I saw a bird at Khandalla in July. The nest was placed against the side of a stout branch, just where a few thin twigs jutted out, and these formed a support to the nest, some of them being incorporated with it. The nest appears small for the size of the bird, the egg cavity measuring about two and three quarters inches in diameter by about one and a half deep.

The nest is composed principally of moss, well lined with fine grass and moss roots.

The eggs are oval in shape, pinched in a little at one end, and measure rather more than an inch in length by about three-quarters in breadth; they are of a pale pinkish-white stone colour, profusely spotted and speckled with claret and purplish-red, and having a few underlying spots of pale inky-purple.

Mr. Davidson found it common in the Kanara jungles, principally on and above the Ghâts.

Kanara, April and May. *J. Davidson, C. S.*

450.—THE YELLOW-BROWED BULBUL.

Criniger ictericus, Sw.

Mr. Davidson has kindly furnished me with the following interesting note:—

"This is a very common bird in all the Kanara jungles wherever the jungle is evergreen. It builds a slight nest on a thin branch of a low sapling. This is fastened by the sides to a fork like an oriole's, and is composed outwardly of rope-like fibre, with a dead leaf or two laid on it, and lined internally with fine grass cut into short pieces. The edge has a slight coating of spider and red ant webs.

"All the nests I have seen have been from eight to fifteen feet from the ground, and none have contained more than three eggs or young (generally two). The eggs are long shaped, of a pinkish-white, faintly blotched at the large end with close blotches of a pink slightly deeper than the ground colour. Some are exactly similar in colour to those of (*Myagra azurea*), the Black-naped Blue Fly-catcher."

452.—THE WHITE-BROWED BULBUL.

Ixus luteolus, Less.

The White-browed Bush Bulbul is common about Bombay, but appears to avoid the Ghât. They are permanent residents, breeding during the rains. Mr. Davidson found them common along the Kanara Coast, breeding like most of the Bulbuls occasionally at almost all seasons.

The nest, composed of thin twigs, is lined with fine grass stems, and is suspended between the twigs forming a fork, in a low bush or tree, and is generally overshadowed by another bough.

The eggs, three in number, are oval in shape, measuring 0·94 inches in length by 0·62 in breadth. In colour they are pinkish-white, thickly spotted and blotched with claret and purplish-red. These markings are much more profuse at the larger end.

Mt. Sion (near Bombay), July & August. *H. E. Barnes.*

455.—THE RUBY-THROATED BULBUL.

Rubigula gularis, Gould.

Mr. Davidson informs me that the Ruby-throated Bulbul is rather a common bird in Kanara forests both on the coast and above the ghâts. Neat nests of the bulbul type in low bushes have been pointed out to him as belonging to this bird, but though a permanent resident he has never taken the eggs.

457.—THE GREY-HEADED BULBUL.

Brachypodius poiocephalus, Jerd.

Mr. Davidson found the Grey-headed Bulbul to be not uncommon in the Kanara forests above the ghâts, where he has no doubt it is a permanent resident, but he knows nothing of its breeding habits.

459.—THE WHITE-EARED CRESTED BULBUL.

Otocompsa leucotis, Gould.

The White-eared Crested Bulbul is the common bulbul of Sind and occurs not uncommonly in Northern Guzerat. They breed from April to August; the nests are usually placed in dense tamarisk bushes occasionally in small babool trees), at heights varying from three to six feet from the ground; they are cup-shaped, slenderly but firmly built, and bear handling well; they are composed of fine twigs of tamarisk, &c., grass roots and vegetable fibre, and are unlined.

The eggs, three in number, very rarely four, are longish ovals in shape, pointed at one end, and are reddish white in colour, spotted, streaked, and blotched with brownish and purplish red. They measure 0·82 inches in length by 0·64 in breadth.

Hyderabad, Sind, April to August.	*H. E. Barnes.*

460*bis*.—THE SOUTHERN RED-WHISKERED BULBUL.

Otocompsa fuscicaudata, Gould.

The Southern Red-whiskered Bulbul is common all along the Sahyadri range and forests adjacent; it is also very common at Mount Aboo.

It is equally common in the vicinity of Bombay.

They breed from March to June, making a deep cup-shaped nest composed of grass roots, with a quantity of dead leaves or dried ferns worked into the bottom, and lined with fine grass and the hair-like roots and stems of ferns.

They are often bound on the exterior with spider webs.

The eggs, two or three in number, are reddish-white in colour, thickly streaked, spotted, and speckled with rich blood and brick-red, with a few scarcely visible spots of pale inky-purple.

They measure 0·9 inches in length by about 0·66 in breadth.

Mt. Sion (near Bombay), March to May.	*H. E. Barnes.*
Khandalla, June and July.	*Do.*
Aboo, May and June.	*Do.*
Nassick Ghâts, Feb. to July.	*J. Davidson, C. S.*
Kanara forests, Feb. to May.	*Do.*

462.—THE COMMON MADRAS BULBUL.

Pycnonotus hæmorrhous, Gm.

The Common Madras Bulbul is very abundant throughout the Western Presidency, except in Upper Sind, where it is very rare.

They breed from April to October, rearing at least two broods in the year. The nest is generally built on a low bush or fruit tree rarely at any great height from the ground. It is neatly but lightly made, cup-shaped, and is composed of grass stems, lined with finer grass, and occasionally with hair. The eggs, three or four in number, are rather longish ovals in shape, pinkish-white in colour, speckled, blotched, streaked and clouded with claret and purplished-red. The markings are liable to excessive variation. They measure 0·9 inches in length by 0·68 in breadth.

Lately at Saugor, C. P., I have found many nests, rather high up in forks of medium-sized babool trees.

463.—THE COMMON GREEN BULBUL.

Phyllornis jerdoni, Blyth.

I have never found a nest of the Common Green Bulbul, although it occurs more or less commonly (with the exception of Sind) throughout the Presidency.

Mr. Davidson, who has been more successful, has kindly furnished me with the following note :—

"This bird is very common on the Nassick ghâts, about Egutpura and is found in all the wooded districts of this Presidency. It conceals its nest in a thick tree, such as a mango or mowa, so that it is in many cases quite impossible to discover it by merely examining the tree from below. The nest, a neat cup, is suspended from the side of a fork or succession of twigs. I have found it only at heights from twelve to twenty feet from the ground. The eggs are very long shaped, and all white, with small blotches of very dark purple sparing scattered over them. I have always found either two or three eggs."

Khondabhari Ghât, Khandesh, Aug.	*J. Davidson, C.S*
Nassick districts, Feb.	*Do.*

464.—THE MALABAR GREEN BULBUL.

Phyllornis malabaricus, Gm.

I can find nothing on record regarding the breeding of this bird, although it appears to be a permanent resident where it occurs.

468.—WHITE-WINGED GREEN BULBUL
OR
THE WHITE WINGED IORA.

Iora tiphia, Lin.

The White-winged Iora is altogether absent from Sind, and is replaced in Northern Gujerat by the next species. It appears to be common in the Southern and Eastern portions of Western India, and occurs not uncommonly on Mount Aboo.

It is of course a permanent resident, breeding from the commencement of the rains until near the end. The nest, a deepish cup, is usually placed on a horizontal bough, generally at a place where a few upright twigs spring out from the bough, helping to keep it securely in position; occasionally the nest is placed in an upright fork, composed of three or four twigs, and in this case the nest is generally deeper.

It is composed of vegetable fibres, lined with fine grass and hairs, and is thickly coated on the outside with spider webs.

It is firmly and compactly made, but the walls are thin, often not more than three-sixteenths of an inch in thickness; the bottom too, when the nest is placed on a horizontal bough, is very thin, often not more than one-eight of an inch, but when it is placed in an upright fork, the bottom is continued to a blunt point, and is then often an inch or even more in thickness.

The nest a good deal resembles that of the White-browed Fantail Flycatcher, but is rather more loosely made and is not quite so compact.

The eggs, two or three in number, are moderately broad ovals in shape, a little pointed at one end; the ground colour is greyish-, yellowish-, or creamy-white, having longitudinal streak of purplish-reddish or yellowish-brown. These streaks start from the larger end, where they often form an imperfect cap or belt, often leaving the smaller end comparatively clear. They average about 0·69 inches in length by rather more than 0·54 in breadth.

Neemuch, July and August.	*H. E. Barnes.*
Baroda, June to October.	*H. Littledale.*

468*bis*.—THE WESTERN IORA.

Iora nigrolutea, Mar.

This the is common Iora of Guzerat, and occurs most abundantly in the vicinity of Deesa, where alone I have had an opportunity of observing; it is equally abundant with *tiphia* in West Khandesh, and appears to straggle a good deal; it breeds about the same time and in the same manner as the Common Iora, but the only eggs I have seen had the ground colour almost pure white, and the markings were two shades of purplish-brown ; but I have no doubt, if a sufficiently large series were examined, no constant difference would be detected.

Deesa, June and July. *H. E. Barnes.*
Dhulia, Khandesh, July. *J. Davidson, C.S.*

469.—THE FAIRY BLUE BIRD.

Irene puella, Lath.

I have never had an opportunity of examining this bird in life, and am indebted to Mr. Davidson, C.S., for the following interesting note, which I reproduce *in extenso* :—

"This, about the loveliest bird in the Bombay Presidency, is a fairly common bird through the forests of Kanara, and I have often seen five or six pairs in a morning's walk. The nests are, however, very difficult to find. The first I obtained was in the end of March, and contained two half-grown young. It was close to a river and a road. The nest was about twenty feet from the ground, in a thin tree, and was visible from any distance; it was a clumsy structure of twigs, lined with fine roots, very much like the lining on *Volvocivora sykesi*, and there was a little moss round the outside.

Another nest taken in the end of April was on a pollarded tree, about fifteen feet from the ground ; it contained two fresh eggs, and the nest was more neatly made, the twigs being bound round outwardly with green moss. The egg or eggs (for one was broken before it reached my hands) was of an olive-green colour, blotched with brownish-olive. It somewhat resembled the egg of (*Eudynamis honorata*) the Common Koel, but was a good deal narrower.

470.—THE INDIAN ORIOLE.

Oriolus kundoo, Sykes.

The Indian Oriole occurs pretty generally throughout Western India, but is decidedly uncommon in Sind, and appears to be replaced on the higher ranges of hills by the Black-headed Oriole.

They are permanent* residents, breeding during May and June.

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* Mr. Davidson, C. S., says :—" A migrant, as far as I can judge, in Kanara, all leaving the district in May.

The nest is a deep purse-like cup, carefully suspended between two twigs forming a fork, to which it is firmly attached by strips of bark, grass, and, occasionally, even bits of cloth.

It is strongly and compactly made, and is well lined with fine grass. From below the nest looks very small, and is usually partially hidden by foliage, above it must be invisible, although placed rather high up, and almost at the extremity of a bough.

The eggs, three in number, occasionally four, are moderately longish ovals in shape, pinched in a good deal at one end, but other forms are not uncommon; they are of a glossy china-white colour, thinly sprinkled at the larger end with spots and specks of blackish-brown, mostly confined to the larger end ; these markings are sometimes almost entirely black, but occasionally they are reddish, or even yellowish-brown, but this last type is very uncommon.

They vary a great deal in size, but the average is rather more than 1·1 inch in length by about 0·8 in breadth. The eggs forming a clutch often differ conisderably both in size and shape.

As soon as the eggs are laid, the birds seem to lay aside their usual timorous disposition, and boldly attack any bird that ventures near the nest; this habit often leads to its discovery. If nestlings are found within a reasonable distance, say a mile or so, and are placed in a cage, in a position accessible to the parent birds, they will attend and feed them, until long after they are able to fly and feed themselves; but as a rule, when the old birds cease to visit them, they refuse food, pine away and die.

471.—THE BLACK-NAPED INDIAN ORIOLE.

Oriolus indicus, Jerd.

Occurs very rarely in Kanara; I know nothing of its breeding.

472.—THE BLACK-HEADED ORIOLE.

Oriolus melanocephalus, Lin.

I have never met with a nest of the Black-headed Oriole. Mr. Davidson, C.S., has kindly furnished the following note :—

"This bird is common throughout the ghâts from Khandesh down to Egutpoora, inhabiting all the warm valleys.

"It is also very common all the year in the Kanara jungles below the ghâts, but leaves the part above the ghâts, at all events, to a great extent in May.

" It builds a very compact nest of bamboo leaves and grass, lined with fine roots, and is suspended between two twigs forming a fork, generally about fifteen feet from the ground.

The number of eggs is three, and they vary a good deal. They are generally of a light salmon colour, with bold blotches of dark lilac-brown scattered over the broader end. They are fairly glossy, many resemble much some types of (*Buchanga atra*) the Common King Crow, but are larger and more glossy." They average 1·14 inches in length by about 0·82 in breadth.

Nassick Ghâts, May to July.	*J. Davidson, C. S.*
Khanbari Ghâts, Khandesh, July.	*Do.*

THE MAN-EATING TIGRESS OF MUNDÁLI.

Since Mr. Reginald Gilbert read a paper on Man-Eating Tigers, before the Members of the Society, on 4th September 1889, the subject has been freely discussed, and we are consequently glad to reprint the following account of the destruction of a veritable Man-Eating Tigress, which appeared in the *Indian Forester* for July 1889 (Vol. XV., No. 7):—

" Our readers will forgive us for being so late in the day with our account of this brute, which had been for more than 12 years the scourge of the hills immediately north of Chakrata. The present paper was, however, already in print before our June Number issued from the press, and it was only want of space that prevented its publication in that Number.

"According to the information we have been able to collect, our tigress seems to have been first heard of in 1876. Throughout her career as a man-eater, she confined herself to a narrow beat hardly 24 miles from end to end, ranging from the Rama Sarai group of villages in the Jumna Valley to the spur immediately overlooking Chakrata.

"After leaving the Jumna Valley she came up to Lokhár at the top of the spur just above Rama Sarai. From Lokhár she followed up, to the other end of her beat, the main ridge which forms the water-parting between the Jumna and Tons rivers. She never left this ridge or its vicinity to go down to the numerous villages which skirt the valleys of the several mountain streams that run down into the

Tons. This ridge, being from 8,000 to 10,000 feet above the sea, is covered with snow from December to the end of March, so that during the winter she remained at the lower elevations round Ráma Sarái. But so soon as the snows were melted, she would come up again, although during April-May and October-November the temperature on the ridge after sundown stands constantly in the vicinity of freezing, and is often low enough for the ground to remain frozen hard for hours after the sun is up.

"There can be no doubt that she took to man-eating under stress of long starvation, due to the difficulty of securing game in the steep mountainous country in which she had established herself. Previous to her appearance tigers were unknown so far north in Jaunsár.

"About that time, however, professional graziers (Gujars), gradually forced to move eastwards from Kashmere owing to scarcity of grazing for their increasing herds, reached the Dehra Dún. The custom of these men is to remain in the hills until driven down to the Sub-Himalayan forests by the severe winter there. Our tigress thus no doubt followed the herds from the Dun forests, and got left behind when these went down again at the beginning of winter.

"She appears from the very first to have had cubs with her, which fact probably accounts for her great destructiveness and boldness soon after her arrival in the hills. In September 1880 she took up her quarters, with three nearly full-grown cubs, in the neighbourhood of Deoban, 3½ miles above Chakrata, and killed three men within a fortnight. One of these cubs was shot on September 15th by Mr. Smythies almost at the upper end of Chakrata; another was killed by Mr. Lowrie eight days later; while the third, put up with the mother in a beat only five days after, got away wounded. Through all the vigorous hunt after her and her cubs during a whole fortnight the tigress escaped scatheless.

"It has been already said above that she took to man-eating owing to the precipitous nature of her haunts, which prevented her from obtaining a sufficient supply of the usual food of tigers, *viz.*, deer, pigs, &c., and, when opportunity offers, cattle. The same circumstance drove her to attacking flocks of sheep and goats, which are very numerous in those rich high-level pastures during the period from the melting of the snows to the approach of winter. She would make one or more rushes through a flock, killing several animals, only a few of which she could eat. Thus her appetites were not purely anthropophagous, although she no doubt preferred the flavour of the better nourished flesh of man. She often apparently disappeared for weeks and months at a time when she chanced to get in amongst a sufficiency of game. When this supply ran short, she would suddenly appear and attack men with increased persistence, killing several within a few days. As she grew older, her taste for human flesh increased, and her fear of man proportionately diminished.

"If near a herd of cattle, she took no notice of the cattle, but went straight for the herdsmen. On one occasion, in June 1883, she walked at night into an out-office of the Lokhár rest-house, where some men were sleeping at the further end, a cow and her calf being tied up in the door-way. She passed these animals without taking any notice of them, and carried off one of the men.

"Mention of this last-mentioned event leads us to a necessary digression in order to recall to the reader's mind the highly imaginative account of the same, which appeared in June last in the *Civil and Military Gazette*, Lahore, and was subsequently reprinted by almost every newspaper in India, and even those in England. The wag who wrote that article put into his picture a bright moon, the invariable cubs, and the usual play with her victim which the fond mother goes in for in order to teach her offspring how to kill. The picture was still further embellished by several human figures perched up in surrounding trees, watching this spectacle of horror. What actually took place was simply this:—The movements of the affrighted cow and calf, and no doubt also the noise made by the tigress as she darted off with her victim, woke the other men, who began to interrogate one another as to the cause of the commotion. Some of them even went to the door to investigate. Everything was, however, still now, and the men rolled themselves up again in their bedding, not recognising in the dark that one of their number was missing. What happened in the meantime outside was that the tigress, alarmed by the sudden exclamations of the awkened sleepers, dropped her man and made off to one side. When all was quiet again, she came back and picked up the unfortunate man, who just then became conscious and groaned aloud with pain. Realizing at last the position of affairs, the men inside the room rushed out with loud cries only to see, in the dim light from the clouded sky, the tigress disappear with their comrade down the slope on to the road below. Mr. G. P. Chill, from whom we had the preceding details a few days after their occurrence, and who was sleeping in the rest-house, came out with his rifle on hearing the cries of the men, but the tigress had already disappeared, and he merely fired off his weapon in the direction in which she had gone, in order to calm the fears of the men. We ourselves were on that eventful night in camp at Mundáli, only 5 miles from Lokháli, and the account we have given above accords in every particular not only with the information given by Mr. Chill, but also with that given to us directly by eye-witnesses, and by Dhan Singh, the headman of Lokhár, whom we met last only a few days after the death of the tigress.

"There was a strange fatality which always brought the tigress to Mundáli while we were there. In 1883 we spent two months at Mundáli, during the whole of which time she kept within the immediate neighbourhood. For several nights running she patrolled the road running along the main bridge above Mundáli, and also the bridle-path connectng Mundáli with that road. She often prowled round our camp at night, on two occasions coming right inside it. The first time she came, it was past midnight, and every one was asleep. Our orderly was however, fortunately sleeping lightly, and was suddenly awakened by the dull thuds of some heavy animal, like a buffalo (to use his own words), galloping down the soft slope just above his *shuldari*. Apresentiment of the tigress' approach made him snatch up a brand from a large fire that was burning immediately outside the opening of the tent, and at the same time to shout away at the top of his voice. He had hardly begun doing this, when the flaps of the tent were suddenly flung open, and he found the brute glaring at him with only the log fire between them. His shouting awoke the half-dozen fellow-occupants of his tent, and between them they made such an infernal hullaballoo, while he kept flourishing the fire-brand across the opening of the tent in the face of the tigress, that the beast could do nothing more than continue standing there and glare at the men. This went on for about two minutes, by which time the whole camp was astir, and a number of men, armed with bludgeons, fire-brands, and anything else they could pick up, rushed on the scene. Such an accession of force was of course rather more than the tigress had bargained for; she sprang back a few paces, tore up in her rage great clods of earth, and sulkily walked away, by the same route by which she came, into some cover not far off. The orderly's tent, which had been pitched about 30 yards in advance of the rest of the camp, was of course forthwith abandoned, and its occupants were only too glad to pass the rest of the night within the body of the camp.

"The next visit the tigress paid us was about 10 P.M., before any one had turned in for the night. The moon, just passed her full, was concealed by clouds, but enough of her light passed through to enable objects up to 20 yards off to be discerned clearly. A party of the servants were sitting gossiping round a fire on the edge of a terrace. Suddenly one of the party, who was facing the edge of the terrace, caught sight of a crouching animal about 8 yards off. Instantly a hue and cry was raised, and the tigress sprang away and disappeared down the slope.

"A few days before our arrival at Mundáli the tigress had entered a cabin built of large hewn slabs, in which about 18 men were alseep, and walked off with one of the sleepers without awaking the rest. This incident and the attack on our orderly's tent combined to render us circumspect, and before retiring for the night we invariably bolted the doors and windows of the rest-house occupied by us. We are reminded of this circumstance by the remembrance of some raillery, of which we were the butt at a dinner party, and the purpose of which was to bring our courage into question. The scoffer, who will recognise himself when he reads this, laughed at the mere idea of the most daring man-eating tiger going *near* a house or tent, much less *entering* it. The evidence of the orderly and his companions who had seen the tigress by the light of their fire, the evidence of our own eyes, which had seen her well-marked foot-prints before the orderly's tent and in the soft soil of the slope beyond, went for nothing. In our terror a leopard had assumed the proportions of a tiger! Against the direct evidence of the eyes of several individuals, who were by no means griffs in the matter of tigers and leopards, the mere opinion of one individual, who said that only a leopard could display the boldness this supposed tiger had been reported to have shown, was accepted as sufficient disproof. The supposed leopard has now been shot, after repeating all its previous performances, which it was so absolutely certain no tiger could have been guilty of; but unfortunately for our scoffer, this leopard has had the bad grace to turn out to be a tiger, not the mythical tiger seen by the dim light of the camp fire through the spectacles of terror, but a real unmitigated tiger.

"For those who are still incapable of believing that a tiger can enter a tent or house, we will cite another instance which occurred last March. Sawing operations were going on just above the Tons, about 24 miles further in the interior of the Himalayas than Mundáli, and the sawyers were located in several huts huddled together by the side of the Tons–Ráma Sarái bridle-path. One night a tigress, who had previously killed and eaten two people, and was accompanied by two young cubs, went up to one of the huts in the middle of the group, pushed open the door, entered the hut, stepped over the first sleeper, and seized the next one by the throat, causing instantaneous death.

"But to return to the Mundáli tigress. We have said before that by a strange fatality her visits and ours to Mundáli always coincided. On the 7th of May, 1889, we reached Mundáli in company with the Forest School students, who were on their hill tour. On our way we had been informed that she had just been killing two women in Ráma Sarái, and so we congratulated ourselves that she was well out of our way. Nevertheless we warned the students and their servants to be careful. One party of four European students pitched their tents on a spur about 80 yards above the place where our orderly's tent had been attacked six years ago. Towards 10 o'clock that night, the moon being up, one of the students happened to come out of his tent, when only eight paces off he observed a large animal standing at the same distance from their kitchen tent. He at once called to the others. The tigress, for she it was, finding herself observed before she was ready to do any damage, fled down the hill and disappeared. The students could hear the thuds of her footsteps as she sprang down the slope.

"The next night the same students, expecting another visit, sat up for the brute; but instead of turning up again at our camp, she killed some sheep belonging to shepherds, whom only four days previously she had follwed up from Ráma Sarái to a high-level grazing ground about 1½ miles above Mundáli. One of these shepherds she had attempted to carry off two days previously, but missing her spring she only clawed his back and was driven off by the father of the young man striking her on the head with a stick, while a plucky large Bhutia dog seized her by the neck. This sudden double attack was too much for her, and she made off as fast as she came. Two of our students sat up the following night over the dead sheep, but although she prowled about the place and gave chase to several buffaloes, she did not come to the kills.

"The night of the 11th was dark and rainy, and we were sure the tigress would take advantage of this circumstance. And so she did. There was a herd of buffaloes just above our camp. Here towards morning, as one of the herdsmen came out alone from the hut in which about ten of them were living together, the tigress suddenly rushed at him. Luckily he dodged her and ran back into the hut. Foiled of her prey, she gave chase to a small but full-grown buffalo, which, taking fright, had separated from the herd and was running down the hill. She soon overtook the buffalo, and killed her just below the road immediately above the head of a deep and steep ravine. As soon as it was light, the herdsmen promptly moved off to another grazing ground about 2 miles nearer Chakrata. The tigress evidently followed them, for she was met just above that locality by our dâk man and syce, who saved themselves by shouting and bowling at her like mad.

"On the news of the buffalo being killed reaching our camp, Mr. Osmaston, one of our latest recruits from Cooper's Hill, and Mr. W. Hearsey, one of our students, got a *machan* tied up near the kill, intending to sit up for the tigress towards evening. To prevent birds from interfering with the kill, Mr. Hearsey set a servant to watch it. About 2 P. M. this man came running back to say that he heard some heavy animal, most probably the tigress, coming up the ravine, above the head of which, as said before, the buffalo had been killed. Upon this Mr. Hansard, another student, came to ask us for the loan of our 12-bore Reilly, and to see whether Mr. Osmaston would accompany him. Fortunately, as the sequel proved, we had previously forced Mr. Osmaston to take the rifle as his own had been left behind at Chakrata for repairs. Both young men started off for the scene of the kill, intending to sit up on the *machan* for the tigress. But after having arrived there, Mr Hansard, who from the very beginning, not being able to realize what a terrible animal a tiger is, had thought of going after the brute on foot, proposed that they should go and look for her, arguing that if they sat on the *machan* they would never get her. Mr. Osmaston, who had arrived in this country only in January last, gaily closed in with this proposal. He, as said above, had our 12-bore Reilly, containing cartridges loaded with explosive conical bullets, nine of which go to the pound ; Mr. Hansard, on the other hand, had only a smooth-bore, loaded with slugs. Armed thus, the two young *shikaris* moved down the hillside, each taking one side of the ravine. The sides of the ravine were so steep and rough (gradient in places exceeding 45°), that walking was extremely difficult, and Mr. Osmaston came down several times in spite of good screws in his boots. It was a good thing that the ground prevented them from moving at anything faster than a snail's pace, for, as events showed, there was ample cover in the shape of rocks and bushes for a tiger to lie concealed within a few feet of the *shikari*, without being noticed by an inexperienced eye. When they had gone down about 180 yards, Mr. Osmaston's side of the ravine became too precipitous for him to walk along it, and he accordingly descended to the bottom with considerable difficulty over rocks, bushes and fallen trees. Meanwhile Mr. Hansard was walking parallel to him about [illegible]0 yards off on the steep slope immediately above. 'Suddenly,' to use Mr. Osmaston's own words, 'I heard a thud followed by a series of short, snappish, angry growls and at the same moment I heard the groans and cries for help of Hansard crushed to the ground by the tigress and struggling, face downwards, to get free. The tigress appeared to be tearing his neck and face with her claws. As quickly as I could, I levelled the double 12-bore at the brute, and although I was very much afraid of hitting Hansard, I knew it was the poor fellow's last chance. So I pulled the trigger, and to my relief saw the brute relax her hold and come rolling down the precipitous slope which ended in a 15-foot drop, nearly sheer. The tigress never ceased her hideous growling even to the moment when she fell into the ravine and lay there in the water within a couple of yards of me. I was hemmed in on both sides, so I knew that if she was still capable of doing damage, it was all up with me. In sheer desperation, as my last chance, I fired the second barrel into her, and springing down the precipitous ravine—a feat which I don't think I could possibly perform a second time—I rushed up the side of the ravine and made or the place where I had seen Hansard lying, his face all gory and apparently dying. I could not, however, find him, and I rushed back to camp, the direction of which I more or less knew, across several spurs and ravines.'

" What happened to Mr. Hansard was this:—As he walked down the slope, the tigress must have perceived him and allowed him to pass on, probably then stalking him. At any rate she sprang upon him from behind, bearing him down at once. Fortunately all but one of her canines had been reduced to mere stumps, and it was probably because she knew this, and also because the slope was so steep, that she attempted to do little more than claw him. Even with her worn-down teeth, if she had seized his head between her jaws, she must have crunched his skull into fragments. Actually she clawed his face and back, dislocating the jaw, but the only dangerous wound she inflicted was with her solitary effective canine, making a hole just behind the ear and penetrating to the back of the mouth. It was a fortunate thing that before the brute could inflict further damage Mr. Osmaston's first shot did for her. The bullet entered in the region of the loins a few inches below the spine. But as the shot was fired from below, the bullet went up against the spine, which it practically broke, and then worked along under it raking it, and blowing up everything in its way until it reached the lungs, where it stopped. This first shot thus completely disabled the animal and rendered her perfectly harmless. The second bullet hit her in the shoulder. A minute after the second shot was fired, Mr. Osmaston's chaprassi, who was at the *machan*, hearing his master's cries for help, rushed down the ravine, and found the tigress stone-dead and Mr. Hansard lying insensible in the water at the bottom of the ravine. After the tigress had let go her hold and rolled down the slope, Mr. Hansard, thinking she would come back for him, had crawled down into the ravine, only to find himself within 10 yards of his enemy, who was of course already dead. It was lucky for him that the shot against her spine had made the tigress at once relax her hold of him, otherwise he would have rolled down with her and been certainly killed in the fall.

Measured soon after death the length of the tigress was found to be 8 feet 8 inches. Her canines, as said before, had been worn down all but one, to mere stumps. Some of them were cracked and chipping off, and two were quite decayed with a hole running through the centre. The buffalo killed by her had not a single tooth-mark on it, and hardly any portion of it had been eaten; its neck had been broken. The tigress was in miserable condition, hardly any fat being found even round her kidneys. Although she killed a good deal, her broken teeth must have prevented her from eating anything like a full meal.

Mr. Hansard was attended to immediately by the Native Doctor attached to the School, and on the third day was carried into Chakrata, where, under Dr. Butterworth's skilful treatment, he made such rapid progress towards recovery at the Military Hospital, that before the end of June he could be removed to Mussoorie, a distance of 40 miles. At Mussoorie, however, the results of blood-poisoning manifested themselves in feverish symptoms of a very severe type, and a series of abscesses formed at the end of the wound behind the ear, which, pressing up against the brain, rendered him delirious for weeks. He has now, however, got through the worst, and it is to be hoped that plenty of rest and a good climate, combined with his youth, will soon enable him to recover his health and strength completely.

ELEMENTARY BOTANY OF THE BOMBAY PRESIDENCY.

By A. K. Nairne.

In the paper which appeared in the Society's Journal for January, 1889, I described a number of common plants of Western India belonging to several different orders but all agreeing in having tubular and more or less two-lipped corolla, and four stamens on the corolla arranged in a longer and a shorter pair (didynamous). In this paper I shall confine myself to the plants of one great order—the largest but one of all the natural orders—*Leguminosæ.* This has an immense number of species spread all over the globe, and derives its name from its fruit, a legume or pod. A legume is described as a two-valved fruit opening length-ways, and having the seeds attached along the inner edge of the valves, that is, along the side of the pod which does not open.

This may be called the constant feature of the order, but it is not sufficient for the unlearned; because there are many plants in the order in which the fruit is so modified as not to be easily recognised as a pod, and there are also some plants belonging to other orders with fruit not easily distinguishable from pods. It is therefore necessary to look for a second feature common to the *Leguminosæ*, and this as regards a great majority of its plants is found in the corolla.

In my first paper I mentioned the great distinctions of monopetalous and polypetalous corollas. The corollas in *Leguminosæ* is of the latter sort, that is, of separate petals. There is however a great distinction between different flowers, which is more easily recognisable even than that already named, *i. e.*, the distinction of regular and irregular corollas. Those are called regular in which the petals, if the flower is polypetalous (or the divisions of the corolla if it is monopetalous), are equal and symmetrical, so that no difference can be seen between the upper, lower, right or left side of the corolla. But the first glance at an irregular flower shows that it has no such uniform symmetry, the centre of the flower being unequal, surrounded by the parts, and the petals often varying as much in shape as in size. There are few flowers which have corollas more absolutely irregular than those of *Leguminosæ*, as regards the great majority of its plants. The corollas have a name given to plants of this order alone, papilionaceous (from *papilio*, a butterfly), or pea-shaped, having five separate petals, one at the top, generally large and broad, and called the standard, a pair opposite to the standard, joined together and enclosing the stamens and pistil, called the keel, and a smaller lateral pair, distinct and standing forward, called the wings. It may be added that the ten stamens are generally united into one cluster (monadelphous), or into two clusters (diadelphous), and that the calyx generally adheres to the pod.

The typical *Leguminosæ* then have pea-shaped flowers and pods; but as there are some genera and species in which the fruit is not pod-like, so there are some which have flowers not pea-shaped, and among these exceptions we find a number in which the flowers are absolutely regular.

The order is, therefore, divided into three sub-orders, which really might as well have been three separate orders.

1. *Papilionaceæ.* Flowers strictly as above, but the pod in some cases much modified.

2. *Cæsalpineæ.* Flowers not truly papilionaceous, but approaching it and irregular; stamens as above, but free from the petals; pod unmodified.

3. *Mimoseæ.* Flowers very small and regular, but petals usually united above the base; stamens often indefinite; pod unmodified.

It may be added that the plants of the first sub-order (which is by far the largest of the three), are mostly herbs, and are found all over the world; while those of the other two sub-orders are mostly trees or shrubs confined to warm climates.

SUB-ORDER I.—*PAPILIONACEÆ.*

The sub-order is represented in W. India by 54 genera, some of which contain a very large number of species. They are distributed over eight tribes, some of which have very distinct features, usually connected with the divisions of the leaves and the shape of the pods. As, however, I am only giving a selection from the species known, it will, I think, be simpler to omit these distinctions of tribes, and to mention instead any feature that may be common to three or four genera as they come, my great object, of course, being to make identification as easy as possible.

NOTE.—As before, D. stands for Dalzell and Gibson's *Bombay Flora*, H. for Hooker's *Indian Flora;* native names are in italics, and should mention with regard to this part of it, that I have now the advantage of referring to Dr. Dymock's "Marathi Names of Plants," which I was unable to do when I wrote my last paper.

1. *Crotalaria.* Leaves (in species here given) simple; flowers yellow (except No. 5 below); standard with a short claw; pod straight, turgid or inflated.

(1) *C. filipes.* A small, prostrate, slender-stemmed plant with, long hairs; leaves oblique, cordate, oblong; peduncles very slender-bearing one or two flowers; pod oblong, much inflated, 8 to 10-seed, ed. Deccan and Konkan common.

NOTE.—There is another small and common prostrate plant very like this, and growing in similar situations;

Heylandia latebrosa. The most obvious difference is that that has solitary and subsessile flowers in the axils, and an ovate pod with one or two seeds.

(2) *C. retusa.* A stout undershrub, branched, nearly smooth; leaves oblong, broader above; flowers large and handsome, veined red, in long racemes; pod linear, oblong; seeds 15 to 20. *Ghágri*· Konkan, Guzerat and Ghauts, common.

NOTE.—This and the next two have a general resemblance to the English broom.

(3) *C. sericea.* Much like the last, but with angled stem and large leafy stipules and bracts. Common about Bombay.

(4) *C. Leschenaultii.* A tall and very handsome shrub; leaves narrow, obovate, silky beneath; racemes and flowers large; pod like the two last. *Dingala.* Common at Matheran and on the Ghauts.

(5) *C. verrucosa.* Stout herbaceous, stems and branches 4-sided and winged; leaves broad, ovate, narrow at the base; stipules half-moon shape; flowers pale blue; pods nearly cylindric, pale brown. *Tirat.* Very common on the sandy sea shore.

(6) *C. juncea.* A tall erect shrub; leaves linear or oblong, silky; racemes very long; calyx covered with rusty hairs; pod sessile, oblong, broader upwards. *Santag.* Commonly cultivated for the fibre, and sometimes called sun-hemp.

NOTE.—There are altogether 21 species of this genus in W. India, three of which have 3-foliate and one 5-foliate leaves.

2. *Trigonella.* Leaves trifoliate; leaflets toothed; standard and wings narrow; keel shorter; pod many-seeded.

T. fœnugrecum. Erect, robust; leaflets lanceolate, oval or obovate; flowers yellow, pretty, long, thin and pointed. *Meethi.* Usually cultivated for báji.

3. *Medicago.* Leaves as the last; pod spirally twisted, indehiscent.

M. sativa. Stem usually erect; leaflets oblong; flowers somewhat racemed, usually purple; pods downy and loosely spiral. Purple medick, lucerne (*loosan*). Cultivated everywhere.

4. *Indigofera.* Indigo. Flowers generally in racemes, red or purple; keel spurred on each side near the base, generally linear or cylindrical.

Note.—There is not much beauty in this large genus; most of the species are a good deal covered with close-pressed hairs.

(1) *I. linifolia.* A small grey plant, much branched; leaves lanceolate or linear, sometimes obovate; flowers in very short racemes; pod round, one-seeded. *Burburra, bhangrá, torki.* Throughout India. H.

Note.—The seed vessel in this is not the least like a pod outwardly.

(2) *I. cordifolia.* Small and diffuse; leaves broad, ovate cordate; flowers very small, in sessile heads; pod oval, 2-seeded. *Godadi, bodago, bo'saka.* Deccan and Konkan. Plains of India generally. H.

(3) *I. glandulosa.* Also a small diffuse species; leaflets 3, deeply pitted with glands underneath; pod brown or reddish, very short angled and with toothed wings. *Vekhári, baraghadam.* The Deccan. Very common everywhere. (*Lisboa.*) On black soil it becomes woody and much branched.

(4) *I. trita.* Much like the last, but more of a shrub and more rigid, the leaves red, pitted; pod long, straight, horizontal, slightly 4-sided. Common.

(5) *I. hirsuta.* A coarse, hairy, erect herb; leaflets 5 to 11, large, obovate; racemes dense; flowers pink; pods crowded, straight, bent down. South Konkan, Guzerat, &c. Graham called it particularly common on Malabar Hill.

(6) *I. tinctoria.* The cultivated indigo; leaflets 9 to 13; flowers greenish or yellowish red; pod turgid, straight, sharp-pointed. *Nil.* D. thinks that it is found wild in many parts of the Konkan. H. doubts it being wild in India at all.

(7) *I. pulchella.* A tall shrub, with long erect racemes of pink or light purple flowers; leaflets 13 to 21; pod straight, cylindrical or turgid, sharp-pointed. *Chimnáti, nirda.* Mahableshwar and other high Ghauts. This is the only handsome species found in W. India, and is very ornamental.

7. *Psoralea.* Leaves simple, dotted with glands, petals all clawed; pod ovoid or oblong, one-seeded, indehiscent.

P. corylifolia. A tall stragging plant; leaves ovate or roundish; irregularly toothed; flowers small, violet coloured, tipped darker, in close long stalked spikes; pod included in the granular calyx. *Bawarchí.* A common weed in the Deccan and elsewhere, especially in cultivated fields. H. calls the corolla yellow.

8. *Tephrosia.* Petals clawed; pod linear, flat, many-seeded.

T. purpurea. Half shrubby, more or less hairy, with a most offensive smell; leaflets 6 to 10 pair, oblong or obovate; flowers red or purple, in long racemes; legumes slightly curved. *Sirpaká, unhála.* A common rank weed springing up in the rains along with *Cassia occidentalis.* There are varieties of this in Sind, Cutch and elsewhere.

9. *Sesbania.* Herbs or soft wooded shrubs; leaves with very numerous deciduous leaflets; petals long, clawed; pods very long and narrow.

(1) *S. aculeata.* Tall and weak, with stem and petioles covered with soft prickles; leaflets 20 to 40 pair, very small, obtuse; flowers in racemes, yellow dotted with purple; calyx nearly entire; pod nearly cylindrical, sharp-pointed. *Rán shewani, chinchani.* Known (in the Konkan) by its wonderfully rapid growth, springing up to the height of 7 or 8 feet in a very few weeks of the rains. H. calls it cosmopolitan in the tropics of the Old World.

(2) *S. grandiflora.* A tree with very large white flowers and curved pods, a foot or more long. Both flowers and pods are eaten. Commonly cultivated but a doubtful native. *Agáshi, hadgi.*

The next 5 genera have pods composed of joints, which when ripe easily separate from one another.

10. *Geissapsis.* Leaflets 2 pairs; flowers with conspicuous membranous bracts.

G. cristata. A trailing plant among grass; leaflets small, obovate; flowers small, orange and brown, each with a large roundish bract edged with stiff brown hairs; pod of 2 round joints. *Barki.* It is a remarkable looking plant, but common.

Zornia angustifolia, also called *barki,* is a little plant of much the same character as this, the 2 pair of leaflets longer and narrow, the bracts sagittate and almost hiding the flowers, the joints of the pods prickly, and sometimes as many as 5.

11. *Alhagi.* Leaves simple; joints of pod several.

A. maurorum, Camel-thorn. A low shrub with green branches and strong hard thorns, one to each leaf; leaves sessile, oblong or obovate, rather fleshy; flowers small, red or purple, in short racemes, which end in a bristly point. *Jawás, Kás.* Very common in Guzerat and Sind, where it is the usual material for tatties.

12. *Smithia.* Herbs; leaflets many, small; corolla yellow, generally with red spots at the base of the petals; joints of the pod flattened and folded together within the calyx.

Note.—Of 12 Indian species 9 are found in this Presidency, and all within a very limited range, *viz.,* the S. Konkan and the Ghauts bounding it; one or two species also about Belgaum. None of the species can be called common, though some are abundant locally; they are all remarkable for their beauty, and at Dápoli, *S. sensitiva, S. bigemina,* and *S. pycnantha* all appear together in the rains. One only, *S. purpurea,* has purple flowers with white spots at the base.

13. *Alysicarpus.* Diffuse plants; leaves generally simple; keel obtuse, adhering to the wings; pod of several joints flattened, not twisted.

(1) *A. vaginalis.* Rather hairy; leaves from oval to lanceolate, cordate at base; stipules large; flowers in racemes, red, whitish beneath; pod thickened at the joints, which are not much divided; calyx in fruit large and chaffy. *Chái, dhámpta.* Common in the Deccan, Konkan and Guzerat. H. makes (2) *A. nummularifolius,* which has roundish leaves, and pods almost cylindrical only, a variety of this. It also is common.

14. *Desmodium.* Leaves simple or trifoliate; pod of several joints, often straight on one side and divided on the other.

(1) *D. triquetrum.* A shrubby rather hairy plant, with triangular branches; leaves ovate, with winged petioles; stipules large, lanceolate; flowers small, in long erect racemes, purple or violet; pod of about 6 irregular joints, beaked. *Kákgánja.* Common and easily recognizable.

(2) *D. gangeticum* is sufficiently like this to be recognised as a relation. Stems irregularly angled; leaves broad, ovate, rather cordate. *Sálwan* Bombay and S. Konkan.

The next two genera are of the Vetch tribe, distinguished by pinnate leaves ending in a tendril.

15. *Abrus.* Climbers, with only 9 stamens united in a tube split above; style short, incurved.

A. *precatorius.* A small climber; stem woody; leaflets numerous, oblong, blunt; pod linear, flat beaked; seeds like a small pea, scarlet, with black spot. *Gunj, chanoti.* Very common in hedges, but not very attractive. The very pretty seeds are used as weights by goldsmiths. There is a variety with white seeds, spotted black.

16. *Cicer.* Leaflets toothed; flowers solitary; pod sessile, turgid, tipped with the style.

C. *arietinum.* Gram. Has generally a terminal leaflet instead of a tendril. *Harbara, channa.*

The next 9 genera (belonging to tribe *Phaseoleæ*) are either climbers or trees, with trifoliate leaves (except *Clitoria*) and linear pods.

17. *Mucuna.* Flowers large; keel larger than the standard and wings; pod covered with stinging hairs.

M. pruriens. A hairy twiner; leaflets ovate, unequal-sided; flowers lurid purple, in drooping racemes; pod large, curved, more or less S-shaped. *Háwaj, Kuhili, Kuyeri.* Common in hedges (from the Himalayas to Ceylon.) H. The pods are awkward to touch, owing to the stinging hairs.

18. *Erythrina.* Trees with prickly branches and red flowers; pod turgid.

E. Indica. Indian coral tree. Bark light and greenish; petioles very long; flowers large, in racemes; pod several inches long; very protuberant at the seeds, which are dark red. *Pángara, máudár.* One of the commonest and showiest trees in the Konkan. A white-flowered variety is said to grow in Salsette.

19. *Butea.* Trees or climbing shrubs; flowers large and showy; keel much curved; pod linear, with one seed at the point.

B. frondosa. Petioles long; leaflets large, roundish; flowers many together in long racemes, orange red and silky; calyx and pedicels deep bottle green; pod thin and downy. *Pallas, Kákria.* This is even a more striking tree than the last when in flower, which is before the leaves appear. It is common in most parts, but not in S. Konkan, and is called *dhák* in Bengal, &c.

20. *Canavalia.* Flowers showy; standard large, roundish; pod thick, three keeled.

C. ensiformes. A large smooth twiner; leaflets ovate, pointed; flowers rather large, of a beautiful pink; sometimes purplish, in long-stalked racemes; pod large, plantain-shaped. *Gáora.* Pretty common in hedges. A variety is commonly cultivated for food.

21. *Phaseolus.* Bracts usually conspicuous; keel much twisted; pod more or less cylindrical.

P. trilobus. A straggling plant; leaflets ovate, usually 3-lobed; flowers small, yellow, in long-stalked racemes or heads, *Arkmath, jangli math.* Common and unattractive. It varies greatly in hairiness. *P. mungo, urid, mung; P. aconitifolius, math; P. rostratus, halához on halákonda;* and *P. vulgaris,* French bean, are all cultivated.

22. *Vigna.* Like the last, but the keel much less twisted.

V. vexillata. Twining, with broad ovate acute leaflets; flowers rather large, pink, few together at the end of a long stalk, fragrant; pod 3 or 4 inches long, many-seeded, hairy. *Birambol, halula* Pretty common in the Konkan and found at Mahableshwar. The handsome flowers remind one strongly of the sweet-pea, but without its delicacy. Cosmopolitan in the tropics. H.

V. catiang is the cultivated *chaoli.*

23. *Clitoria.* Flowers very showy; leaflets up to 7; standard spoon-shaped, very large.

C. ternatea. A beautiful climber; leaflets ovate; flowers solitary, deep blue and white, with 4 long bracts; pod straight and thin. *Bhovera, Kájali.* Common in hedges in many parts, and atonce noticeable by the size and shape of the standard.

24. *Dolichos.* Petals usually equal in length; pod flat, recurved.

D. lablab, pauti. Cultivated in the Konkan as a cold-weather crop, and *D. biflorus, kulti,* cultivated in the Deccan.

25. *Cylista.* Corolla enclosed in a large scarious calyx, and petals equal in length; pod small, oblique, enclosed in the calyx.

C. scariosa. Leaflets ovate, wrinkled, downy; flowers in racemes; corolla yellow, red streaked, hidden in the large, withered-looking calyx; a bract of the same shape soon falls off. *Rángáora.* The Konkan and Ghauts. Very common in Salsette.

26. *Cajanus.* An erect shrub; petals equal in length; pod straight, tipped with the style.

C. indicus. Pigeon pea. Silky, leaves trifoliate; leaflets oblong, lanceolate; flowers yellow, often veined with red, 2 or 3 inches long. *Tur, Dál.* Cultivated all over India for the grain, and the stalks used in making gunpowder.

The remaining species of *Papilionaceæ* here given are either trees or climbing shrubs, with odd-pinnate leaves and indehiscent pods.

27. *Dalbergia.* Leaflets alternate; flowers small, white or pale, only half opening; pod thin and flat, 1 to 5-seeded.

(1) *D. latifolia.* The blackwood tree. Leaflets 3 to 7, roundish, either with a small point or notched; flowers yellowish-white, in small close panicles; pod lanceolate. *Sissa, Kálruka, tâli.* Common in S. Konkan and S. M. Country, also on the Ghauts. The *Sissu* or *Shisham* of N. India is a different tree, *D. Sissu*: it is thought by Dr. Brandis to be indigenous in Guzerat.

(2) *D. paniculata.* Bark light grey, smooth; leaflets 5 to 6 pair, ovate or obovate; flowers in large panicles, tinged with blue; calyx greenish-white; pod lanceolate, pointed. *Pasi, pádri.* Mawal districts and Matheran, N. Konkan. In the Panch Mahals it is a common and pretty tree, rather resembling the *Karanj.*

28. *Pongamia.* Leaflets opposite; pod woody, oblong, flattened.

P. glabra. Leaflets 5 to 7, ovate, smooth, rather large; flowers in axillary racemes, pale, deciduous; the standard large; calyx entire, brown; pod more or less oval, with short beak, 1 or 2-seeded. *Karanj, Sukhchain.* One of the commonest and handsomest trees in the Konkan: not seen much at any great distance from the sea.

29. *Derris.* Climbers; leaflets opposite; calyx often coloured; pod thin and flat, more or less winged.

D. uliginosa. Smooth; leaflets 3 to 5, oval, rather blunt and fleshy; flowers small, pretty, pale rose-colour, in erect panicles; calyx reddish brown, with shallow teeth; pod nearly round, veined, winged at the upper edge and with a hooked point.

Common near the sea, but also found in other parts.

SUB-ORDER II.—*CÆSALPINEÆ.*

The species of this sub-order are mostly trees or shrubs, very often of great beauty; but there are only 8 genera represented in Western India, and these vary a good deal, so that it is not easy to mention any species as typical of the whole sub-order.

1. *Cæsalpinia.* Prickly shrubs with showy yellow flowers; calyx deeply cleft, the lowest lobe largest and hooded; petals spreading.

(1) *C. bonducella.* A large climber; pinnæ 4 to 8 pair; leaflets about 4 pair, smooth, oblong, obtuse; flowers in racemes, each with a lanceolate bract; calyx rusty; pod ovate, swelling; very prickly

seeds 2, large. *Sagargota, Kachki, Karbat.* Common in hedges; most so in Guzerat, I think.

(2) *C. sepiaria.* Spreading, smooth; pinnæ 6 to 10 pairs; leaflets 8 to 12 pairs, linear, oblong, obtuse; racemes large, erect; calyx coloured; pod linear, oblong, smooth, with a long abrupt point, 4 to 8-seeded. *Chillar.* Common in the Deccan. It makes an impenetrable fence.

C. coriaria is the *libi,* or *dividivi* tree.

2. *Poinciana.* Erect, unarmed trees, differing from the last in having a valvate calyx of 5 equal segments.

P. pulcherríma, the common *gulmohar* (gold-mohur tree); *P. regia,* the royal gold-mohur: both well known.

P. elata, sandesrá, is a much less ornamental species with white flowers changing to yellow, and long dark filaments. H. calls it truly wild in the W. Peninsula, but D. and Graham knew it only in gardens.

3. *Cassia.* Sometimes herbs; flowers rather large, yellow; some of the stamens often imperfect or obsolete; the petiole or midrib often with one or two conspicuous glands.

C. fistula. Tree; leaflets 4 to 8 pairs, large, ovate, pointed, smooth; flowers in long drooping racemes; pod quite cylindrical, brown, smooth, one or two feet long. *Báwa, garmála, chimkani.* The Ghauts and Konkan. Common throughout the forest tracts of India. (*Brandis.*) This beautiful jungle tree is well known and easily recognised by the likeness of its flowers to laburnum.

(2) *C. occidentalis.* A large, smooth annual; leaflets 3 to 5 pairs, ovate, lanceolate, acute; flowers long-stalked; pod long, thin, nearly cylindric. *Thorala tákla, Kásoda, Kasundro.* Abundant in waste places nearly everywhere, springing up very quickly in the rains, generally with *Tephrosia purpuria.* It has a strong offensive smell.

(3) *C. sophora.* } Closely allied to the last and with the same
(4) *C. tora.* } native names, but shrubby; the pod in the first more swollen, particularly towards the top, in the second very long and slender, 4-sided, sharp-pointed. Very common, and both found generally throughout India. H.

(5) *C. absus.* A hairy plant, above a foot high; leaflets 2 pairs, unequal-sided; flowers solitary or in a short raceme; pod nearly straight, strap-shaped, bristly. *Chimar, chaksu.* This is very common both at Bandora and Dápoli, and I believe elsewhere,

but is not given by D. Everywhere in the tropics of the Old World. H.

(6) *C. pumila.* A low or procumbent plant, with 10 to 30 pairs of leaflets, very small and unequal-sided; flowers above the axils; pod flat, linear. *Sarmal.* Common generally. *C. glauca.* A tree with a heavy smell, *karud,* is commonly cultivated.

4. *Saraca.* Corolla none; calyx coloured, long-tubed, with 4 unequal segments; stamens 3 to 8, long, exserted.

S. Indica. A small tree; leaflets 3 to 6 pairs; flowers in large round heads, orange-coloured, changing to red bracts, &c., coloured; pod broad, flat, leathery. *Ashoka, jasondi.* Konkan and Ghauts, not very common. This was the tree formerly and appropriately called *Jonesia ashoka,* the name of the illustrious Sir William Jones being thus joined to the Sanscrit name. No one would from the flower guess that it belonged to the *Leguminosæ.*

5. *Tamarindus.* Petals 3, the upper hooded; stamens 3, monadelphous; pod pulpy within.

T. Indica. Tamarind tree. Leaflets very numerous, obtuse; flowers few together, in lax racemes; pod thick, more or less curved. *Chinch, amli.* H. calls it a doubtful native. The flowers of this also are unlike the order.

6. *Bauhinia.* Flowers showy; petals generally clawed; stamens sometimes imperfect; leaves simple, deeply 2-lobed.

B. racemosa. A small crooked tree; flowers in racemes, yellow or white; calyx spathulate, split on one side; pod woody, thick. *Apta, âsandra.* Common in most parts. There are two or three other species, either wild or planted, and they are all easily recognised by, the leaves, which are almost unique in shape, being almost round, but divided into two lobes from the top, the division extending sometimes nearly to the petiole, sometimes only a short way down.

SUB-ORDER III.—*MIMOSEÆ.*

Leaves (in all here given) bi-pinnate; flowers very small but many together; petals equal.

NOTE.—There is a great resemblance in the flowers of the many species of this sub-order, so that any one who knows any of the acacias would probably recognize any of the species here given as belonging to the same family; but it should be mentioned that the tree commonly called the acacia in England, *Robenia pseudo-acacia,* belongs to the *Papilionaceæ.* There are only 7 genera of the sub-order represented in W. India.

1. *Entada.* Woody climbers with tendrils ; flowers in spikes ; calyx minute ; stamens 10 ; pod joined outwardly.

E. scandens. An immense climber, the main stem often with a spiral wing ; spikes about 6 inches long, white, becoming yellow ; pod a yard long ; flowers hard and woody, reddish brown. *Garbi, Gardal, Khairi.* The Ghauts and Konkan hills. The immense pods of this must be known to many who have never handled either the flowers or the leaves, for these often grow so high above the ground as to be quite inaccessible.

2. *Mimosa.* Leaves sensitive ; flowers in dense round heads, stamens 8 or 10 ; pod flat-jointed.

M. hamata. A thorny shrub ; heads of flowers pink, long-stalked; pod curved, with a border on each edge and large hooked prickles. *Arkar.* Pretty common in the Deccan and Guzerat.

M. rubricaulis. Very like this, but the flowers reddish, becoming white, and the pod longer and thinner ; is attributed by D. and Graham to Malabar Hill, and by H. called common through India. I have seen it only in the E. Deccan.

3. *Acacia.* Prickly shrubs or trees, with yellow or white flowers, in round heads or cylindrical spikes; stamens indefinite, free, much exserted.

NOTE.—Most or all of the species have glands on the petiole or between the pinnæ or both, and the leaflets are small.

(1) *A. arabica.* Thorns straight, white ; flowers in round heads, yellow, fragrant. This is the well-known *babúl* tree, and, like most of the genus, is an inhabitant of dry regions.

(2) *A. suma.* A small tree with white bark and hooked thorns, in pairs ; flowers white, in spikes ; pod strap-shaped, straight. *Khair, Khaderi.* This delicate looking and pretty tree takes the place of the *babúl* in the Konkan.

(3) *A. concinna.* A large climbing shrub; prickles hooked flowers yellow or white, fragrant, the round heads in panicles ; pod thick and succulent, contracted between the seeds. *Chikakai.* Common in the Konkan and Ghauts ; the pods are used for soap.

(4) *A. pennata.* A large climbing shrub ; thorns straight or nearly so ; flower as in the last ; pod straight, thin, often reddish. *Shembi.* Common in the Konkan: the bark is used for dyeing nets.

4. *Albizzia.* Large unarmed trees ; flowers in round heads ; stamens indefinite, very long, united at the base; pod long, thin, strap-shaped.

(1) *A. lebbek.* Flowers white, very fragrant ; heads long, stalked or irregularly racemed ; pod nearly a foot long, smooth, straw-coloured. *Siras, farari.* Common in the Konkan and elsewhere.

(2) *A. stipulata.* Stipules large, acute, reddish ; heads of flowers in panicles, the long brush-like stamens pink in the upper half ; pod reddish brown, smooth. *Lallai, shembar.* This very beautiful flat-topped tree of the Ghauts and S. Konkan grows in perfection at Matheran. It is as well to mention here the only tree belonging to another order, which is likely to be taken for one of the *Leguminosæ.* The order is *Moringeæ,* which contains only one genus and 3 species, but botanists have found the greatest difficulty in fixing the position it should occupy. Outwardly, however, it much resembles *Leguminosæ.*

Moringa. Trees with soft wood ; leaves alternate ; petals 5, unequal ; stamens 5 perfect and 5 imperfect ; capsule pod-like.

M. pterygosperma. The horse-radish tree. Leaves very large, twice or thrice pinnate ; leaflets very small ; calyx as well as petals white ; capsule a foot long, slender, 3-angled. *Sheogá, shekla.* Generally cultivated. *M. concanensis* is very like this, but the leaves and panicles larger ; the flowers yellowish, red-streaked and fragrant. *Sainjna, mua.* Wild in the Konkan.

The above list will be found, I think, to include all the leguminous plants that are common or very noticeable in the Bombay Presidency, and a large proportion of them are very common. And if all orders of plants could be as easily identified as the *Leguminosæ,* we might expect Botany to become a much more popular study. But I must repeat what I said in my first paper, that if any one begins by getting up the common plants of a few of the largest orders, he will by the time he knows them have got his eye so well in, and know so much of botanical terms and principles, and probably also will be so much interested in the work of identification, that he will find no great difficulty in proceeding to the less easy orders.

NOTES ON A CATERPILLAR FARM.

By Mrs. W. E. Hart.

During the last rains in Bombay we started a small caterpillar farm, noting whatever seemed to us worthy of remark in the life history of the insects. Some of these notes we venture to offer in the hope they may interest some of your entomologist readers. Our stock from first to last consisted of eighty-six head of insects, belonging to forty-one species. Being new to the work, we unfortunately kept all our specimens in the same enclosure. The result was that, like the twins in Mr. Locker's famous song, they "got completely mixed," and we were unable to say with certainty, in some instances, which imago resulted from which pupa, or, indeed, in the case of some of the buried pupæ, to identify beyond a doubt the pupa with its larva. The following notes on twenty-seven cases give the results only of such observations as we are sure are correct throughout.

But first, as much by way of warning as example to other beginners in the same interesting pursuit, we will describe our system. We need not say we shall be very thankful for such suggestions of improvement as any of your readers may kindly trouble themselves to offer.

Across a window in a well-lighted room we set a table about four feet long by two wide by two and a half high, with an upright rim of thin wood, about two inches high, running all round its top. Its feet stood in saucers of water to prevent the approach of ants and other noxious visitants. But this precaution was not wholly successful, as we forgot to clear of other insects all the plants and earth introduced for the caterpillars. The result, in one instance, was that the ants so imported devoured alive a caterpillar half turned into a chrysalis, as he was trying to bury himself in a box of earth.*

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* A somewhat similar catastrophe befel a very large caterpillar we had at Matheran in May. He buried himself apparently in good health on 20th May. On 3rd June about thirty flies were found in the cage. As no imago appeared from the caterpillar, we exhumed him, and discovered that he had very literally been "eaten of worms," which, after making their way out of his abdomen, immediately constructed little cells of the earth round their victim, in which to pass their pupahood, and from which they emerged in the shape of the flies we found in the cage. The caterpillar's carcase, when we found it, consisted of the empty desiccated skin with a mass of earthen cells protruding from its abdominal region in such a manner as to suggest that its late proprietor had burst himself in trying to swallow a mud honeycomb. He must have been "fly-blown" before he buried himself, and carried the eggs with him underground, where the larvæ of the flies were hatched inside him and requited his hospitality by devouring him.

A companion was saved from a like Herodian end by being removed from the earth before he was attacked, and then suspended from the roof of the cage in a twisted cone of brown paper, where he developed into a "death's-head" moth.

The cage was a light movable frame of wood, just fitting inside the rim round the table, and about two feet high. Over this was stretched mosquito net for the sides, ends, and top. The table thus formed the floor of the cage, but to allow of its being more easily kept clean, it was carpeted with large sheets of coarse brown paper. The dimensions of the cage gave ample space for the butterflies and moths to stretch and dry their wings on emerging from their chrysalises. But to avoid the confusion mentioned above, it would have been better had the cage been divided into compartments. In the middle of one of the long sides was the door, the frame of which, made of the same wood as that of the cage, was about ten inches wide, and of the same height as the cage. It was closed by a loose curtain of mosquito net tacked to the bottom of the cage, folding over the top, and wide enough to well overlap the doorway on each side. This was fastened by loose strips of thin bamboo sprung in against the uprights and across the top of the doorway. It was wide enough to allow a hand and arm to pass in to manipulate the contents of the cage, or a head to observe its inmates, without moving the cage at the risk of disturbing such caterpillars and cocoons as might be clinging to the sides or top. It would, however, be convenient, and for a cage divided into compartments necessary, instead of one small door in the centre of the side, to have the whole side constructed on the same principle.

In the cage we put some vases, standing steadily on wide heavy bottoms, for water, in which to immerse the stalks of sprigs from the food-plants of our caterpillars. The tops of such vases should be covered with cards pierced with holes, through which to pass the stalks into the water, for we found that to leave them uncovered resulted in the death by drowning of some caterpillars, who crawled down the stalks into the water, and were too fat or too stupid to turn round and crawl up again. Besides these vases, we put into the cage some boxes of earth for the accommodation of those insects who pass their pupahood underground, and a few chunks of soft rotten wood for those who prefer that element. Some twisted cones of brown paper in the corners offered quiet seclusion for such caterpillars as seek retirement from the world, without digging their own graves, making their own coffins, or weaving their own shrouds.

In regard to the management of stock, experience taught us four great canons: 1, Never handle a specimen; 2, keep the species distinct; 3, diet each specimen only on the plant on which it was found; and 4, when a caterpillar leaves its food-plant, leave it alone.

1. Even the gentlest handling of a caterpillar or chrysalis, resulting in no apparent injury at the time, we found was often followed, especially in the larger sorts, by a malformation or imperfect development of the imago. Sometimes the ill-consequences declared themselves sooner or more disastrously, and the caterpillar, though showing no external marks of ill-treatment, sickened and died. In one notable instance, a very fine specimen, tenderly picked off a plant by a servant with his finger and thumb, and carefully brought upstairs in his closed fist, so resented the liberty, that, as graphically described by a lady friend, "it fermented and burst" within twenty-four hours. A specimen should be collected by carefully picking the twig on which it is found and transferring both together to the box. Where this is impossible, and in the rare instances in which it is necessary to move a caterpillar or chrysalis in the cage, it should be lifted by means of a leaf, very gently pushed under it, and not raised until the insect is wholly on it. When the food and water are changed, which should be daily if possible, the caterpillars must not be forcibly transferred to the new leaves. If any leaf on which a caterpillar is engaged be picked off the old sprig and gently placed on the new, the caterpillar will soon of its own accord leave the stale leaf for the fresh.

2. Provided they get food enough, any number of individuals of the same species apparently will dwell together in harmony on the same sprig. But with individuals of different species the case is otherwise. In confinement, the members of some species seem to resent the mere neighbourhood of those of another in a manner almost human. We had the caterpillar of the "death's-head" moth above-mentioned on a Caladium leaf, and two caterpillars of *Danais chrysippus* on a sprig of *Calotropis gigantea* in the same vase. The "death's-head," wishing to change his skin, left his food plant, as the manner of many caterpillars is at such times, and tried to make his way through his neighbour's territory. But the Danaides, holding views as pronounced as those of any English game-preserving squire on the rights of property and the iniquity of trespass, set on the intruder, and so belaboured him that we were obliged to put his

Caladium leaf in a separate vase. Even then he was not safe, for the two vases being one day unhappily set so close together that one of the Calotropis leaves hung over so as to touch the Caladium leaf, the Danaides crossed into their enemy's country and renewed their attack. We could not see whether they actually bit him. If they did, they did not seem to penetrate his skin. But they butted and hustled him on both sides in a way that must have been painful to so soft-bodied a creature, till at last he fell off the plant on to the floor of the cage, where he lay stunned and apparently exhausted for nearly half an hour. It may have been this treatment that drove him to seek, sooner than he would have done, shelter in the pupa form in the box of earth whence we afterwards had to rescue him from the ants. For as an imago, though perfectly developed and well coloured, he was under-seized.

3. A change of leaf seems as bad for a caterpillar as a change of milk for a baby: silkworms, no doubt, "as every school-boy knows," can be fed indiscriminately on mulberry, lettuce, or dandelion leaves without worse effect than a difference in the colour of the silk. But this omnivoracity seems to be a peculiarity in the constitution of the silkworm, induced, perhaps, by its Chinese education. With the wild caterpillar of the Indian jungle, it is not so. To thrive, he must have only that plant to which he has been accustomed from his earliest infancy. Though caterpillars of the same species are found on plants of quite different species, and each will thrive equally well on its own food-plant, yet the same individual should not be fed on a different variety of plant, however closely allied to that which is its natural food. Thus we found a caterpillar taken on a sweet lime* (*Citrus limetta*) could not be fed with the leaves of a sour lime† (*Citrus acida*), nor even one found on a jungle mango‡ (*Mangifera indica*) with leaves from a garden fruit tree. The new food will either be entirely rejected, and the caterpillar die of starvation, or it will so internally disagree that death will result from fermentation and explosion, in the manner above described as the effect of handling.

4. A caterpillar leaving its food-plant to wander about the cage, generally does so only in search of a quiet place to change its skin or turn into a chrysalis. To be disturbed at such times, even by benevolent attentions, is likely to result in disaster. The best way is to leave it quite alone, only placing the food-plant near it in such a

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* Native name, *Mita nimbu.* † Native name, *Nimbu.* ‡ Native name, *Am.*

position that it can easily return to it when, like Mrs. Gamp, "so disposed." In a few species, however, this roving tendency seems to be the result of a constitutional impatience of restraint, such as gipsies and Highlanders are said to feel under the artificial conditions of life in civilized cities. Such caterpillars we never succeeded in rearing. They were principally of two sorts, a small black hairy one found in great numbers on pipal trees during July and August, and a larger lighter-coloured one, also hairy, found in equal numbers about the same time on the mango trees at the foot of Chinchpoogly Hill in and around the Sewri Cemetery. Though plentifully supplied with their proper food, they refused all sustenance and wandering about the floor, walls, and roof of their prison, died at last of broken hearts—or empty stomachs. Generally speaking, however, caterpillars do not seem to suffer from nostalgia, but accommodate themselves to their altered circumstances, provided they are properly fed and not injudiciously handled.

Now for our results. Of the twenty-seven cases here noted, sixteen resulted in butterflies, and eleven in moths. Of the sixteen butterflies ten belonged to the sub-family *Papilioninæ*, and six to *Danainæ*.

Of the *Papilioninæ*, six were *Papilio agamemnon*, a handsome green and black butterfly, common in Bombay, but a good specimen of which it is hard to catch, owing to its quick high flight and restless habits; three were *Papilio pammon*, also a common butterfly in Bombay, the males of which, also restless and quick fliers, are black with a row of cream-coloured spots round the posterior margin of the hind wings, which are also shortly "swallow-tailed," and the females of which are commonly black and red, in imitation of two other species, *Diphilus* and *Hector* as described in a paper on "Mimicry" at page 228 of the 4th volume of this Journal; one was *Papilio panope*, a rare butterfly in Bombay, of which there is only one specimen in the Society's collection. It is dark-brown, with a double row of cream-coloured arrow-head shaped marks round the margins of both wings, and an orange spot on the bottom of the hind wing. Of the *Danainæ*, four were *Euplœa core*, one of the commonest butterflies in Bombay, moderately large, but a weak flier, of a purplish-brown colour, with a double row of white spots round the edges of the wings; two were *Danais chrysippus*, also one of the commonest butterflies in Bombay, and a weak flier of moderately large size, in colour bright terra-cotta, the forewings tipped with black and white, and the hindwings bordered with a narrow black band.

Papilio agamemnon.—Nos. 1, 2, and 3 were found on the upper side of leaves of *Guatteria longifolia*[*] at the Ladies' Gymkhana on 28th July. They were then barely ¾ inch long, and of a smoky gray colour, slender at the tail end, but thickening so rapidly towards the head as to have a bulbous appearance. The body was smooth, but furnished with eight short tentacles, two by the eyes, our at the thickest part of the body, and two at the tail. Besides these, were two retractile tentacles of a paler yellowish colour in the front of the head, generally invisible, but shot out whenever the caterpillar was annoyed or alarmed, as, for instance, when blown upon. The use of these seems to be to startle birds and other enemies, and deter them from an intended attack, by the appearance of a sting. But in reality these tentacles are as soft and innocuous as the others.[†] On 29th July these caterpillars changed their skins, and immediately ate their cast skins. This perfection of cannibalism seems not uncommon among caterpillars till the second or third change of skin, after which they abandon their carnivorous, or rather cutivorous habits, and adhere to a strictly vegetable diet. The subjects of this memoir grew rapidly till they were about 1½ inch long, their colour changing gradually meanwhile to that of the leaves on which they fed.[‡] By 3rd August all three were completely clad in bright green. No. 1 assumed the chrysalis form on 5th August, No. 2 on 6th, and No. 3 on 10th. The chrysalises were of the same green colour as the caterpillars, and attached in a nearly upright position by the tail end to the stalks or undersides of the leaves. The imago appeared of No. 1 on 18th August, of No. 2 on 19th, and of No. 3 on 20th. The last was therefore three days less *in statu pupillari* than the others, but the imago seemed as well developed in all respects.

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[*] Native name, *Asok.*

[†] Weismann, in his *Studies in the Theory of Descent*, has noticed the "terrifying attitudes" assumed by certain caterpillars as a protection from the attacks of insectivorous enemies. The retractile tentacles of the larva of *P. agamemnon* can hardly be intended for use as antennæ, or they would be permanently protruded, like the front pair of tentacles of the larva of *Euplœ core* described below.

[‡] For a very interesting account of the colours of caterpillars, and their relations to the food plant and surroundings of the insects, see Weismann's *Studies*, cited above, translated by Meldola, and the translator's notes. The subject has been excellently investigated by Mr. Poulton in a series of papers of great interest contributed to the *Transactions of the Entomological Society in* 1885-6-7, *The British Association Reports*, 1867, *and the Proceedings of the Zoological Society*, 1887.

Nos. 4, 5, and 6 were found on 4th September on a "Soursop"* (*Anona muricata*) in our garden at Cumballa Hill. Two of them were rather larger than the specimens just described when first found. The third was so much smaller he could hardly have belonged to the same brood. He was soon lost, being probably thrown away with the old leaves when the food was changed, an accident which should be guarded against by careful examination of both sides of the leaves and the stalks. Of the remaining two, one came to his end by drowning in the manner already described. The third entered on his pupahood on 19th September, and the imago appeared on 30th, taking two days less than Nos. 1 and 2 and one day more than No. 3. On 21st September we observed a female of *Papilio agamemnon* laying eggs singly on the bark of twigs of *Guatteria longifolia* on the Pedder Road. We secured a few, but they were unfortunately lost before they were hatched. From the dates above given, however, it would appear that *P. agamemnon* in Bombay continues to breed at least through July, August, and September.

In early infancy the larvæ of this species resemble the droppings of small birds, but not so strongly as do those of the species next described.

Papilio pammon.—We retain the name by which the specimens in the Society's collection are named, and under which certain habits of mimicry in the larvæ and pupa were described at page 229 of the 4th volume of the Society's Journal, but Mr. de Nicéville prefers the name *P. polytes* for this species.

Nos. 1 and 2 were found, apparently just hatched, on the upperside of the leaves of a sweet lime (*Citrus limetta*) in our garden on 1st August. Their remarkable resemblance at first to bird-droppings, and afterwards to the leaves of the food-plant, as well in shape and position as in colour, has already been described in the paper above mentioned. The protective imitation by the larvæ of this species is much closer than by those of *P. agamemnon*, possibly because they are not furnished with the same forbidding tentacles.

Our specimens attained to the length of about 1½ inches before assuming the pupa form. This No. 1 did on 9th August and emerged a perfet male imago on 20th. No. 2 was "found drowned" on 10th August, when apparently on the point of turning into a chrysalis. No. 3 was taken on the same tree as the others, but some weeks later, and belonged probably to another brood. She assumed the pupa form on 27th August, and a female imago of the *diphilus** type resulted therefrom on 7th September.

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* Native name, *Bilaiti nona.*

These dates again would seem to show that this species breeds in Bombay all through the months of July, August and September at least.

For a day before assuming the pupa form, the larva remains motionless, closely hugging the stalk of the leaf on which it is resting. But the pupa is attached only by the tail end, with its head upwards, inclined at an angle of about 30° from the stem, and steadied by two guy ropes of almost invisible gossamer. We did not succeed in witnessing the exact moment and manner of this change of position, as in both instances it took place during the night.

Papilio panope.—The very handsome caterpillar of this species, rare in Bombay, was found on the upper side of a leaf of a Cinnamon tree† (*Cinnamomum zeylonicum*) in our garden on 14th August. It was then upwards of 2 in. long, and on the point of assuming the chrysalis form, which it did on the 16th. The imago emerged on 31st August with the tip of its right forewing damaged, owing probably to careless handling of the larva by the servant who brought it in. The larva, which was somewhat deeply jointed, was of an olive-green colour, with small black dots, and larger crimson spots on the joints, and broad irregular markings of cream colour on the sides and back. On the back and head were short black tentacles. The chrysalis, attached by short black silky hairs at the tail end to one of the uprights of the cage, head upwards, in the nearly vertical position characteristic of the *Papilionidæ*, and of a light brownish gray, marked with deeper brown and black, very closely resembled the rough bark or a piece of dead wood. The imago seems to imitate *Euplœa core*, which is also imitated by the female of *Hypolimnas bolina.*

Euplœa core.—These curious caterpillars were found on *Anodendron paniculatum*,‡ in the Ladies' Gymkhana, on 31st July. They were smooth, slender, and of a general reddish brown colour, but on the back a very pale mauve, and closely marked with narrow dark brown transverse rings. They were furnished with eight dark brown tentacles arranged in pairs; one, long and pointing forward, used as antennæ, above the second pair of legs from the head; another, shorter, above the third; another, yet shorter, between the third and fourth; and another, about the same length as the second, at the tail. In assuming the pupa form, which they did when about 2 inches long, they underwent a remarkable change. Leaving the food plant, they attached themselves to the undersides of other leaves, where, losing all likeness to caterpillars, and indeed to any living creature, they appeared to turn into unpleasant looking lumps of muddy slime or gum. These gradually assumed shape, hardening and brightening, till on the third day they were unmistakable chrysalises of burnished gold, hanging by the ends of their tails, with their heads downwards. The imago appeared in from seven to eight days after the chrysalis had assumed its bright metallic appearance.

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* Here again we preserve the name given to this species in the Society's Collection and in the paper above mentioned, but Mr. de Nicéville prefers the name *Aristolochiæ*.

† Native name, *Dalchini*.

‡ Native name, *lamtani*.

Danais chrysippus.—These were found on *Calotropis gigantea** in our compound, on 15th September. In general appearance as to size, shape, tentacles, and dark ring markings of the body, they were not unlike the caterpillars last described, but differed from them in colour, being of a pale blue gray on the back, with yellow sides, and having ten pairs of oval yellow spots edged with black along the back. They assumed the chrysalis form on 17th September in the same position as those last described, and leaving the food plant to do so, but passing through no intermediate slimy stage. Of the chrysalises, one, which was suspended from the brown woodwork of the cage was green, the other, suspended from the white mosquito net, was pale pink. Both opened on 24th September. We could detect no difference in the butterflies, except that in the one from the green chrysalis the rings round the underside of the abdomen were narrow, black, and continuously linear, while in the other they were broader, brown, and so deflected towards the centre from the sides as to have a somewhat crenate appearance. These butterflies are imitated by the female of *Hypolimnas mussipus.* The dichroic character of the pupa is noticed by Messrs. Marshall and de Nicéville in their very valuable work on the Butterflies of India, Burma and Ceylon (Vol. I., p. 51), where Mr. Wood-Mason is cited to the effect that the difference in colour is not sexual but a protective resemblance, in the one instance to the leaf, in the other to the flower-bud of the food plant. Our specimens, it will be observed, chose positions in which such protective resemblance could have no value. We thought the difference in colour might possibly be due to a difference in the light, as the chrysalis in the darker position, attached to the brown opaque body, was the darker in colour, while that in the lighter position, attached to the white transparent curtain, was itself almost white.* The point would seem to be worth further careful investigation. That light has an effect on animal coloration as well as vegetable is beyond a question. This effect in insect life would appear to be illustrated by a gradual change from pale cream colour to orange of the lighter-coloured portions of the wing of *Papilio erithonius.*

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* Native name, *Mudar.*

Of the eleven months, one, the "death's-head" already mentioned, belonged to the family *Sphingidœ,* and four tussore moths (*Saturnia mylitta* to *Bombycidœ.* The remaining six belonged to two species, one to the first and five to the second, which we have been unable to determine.

Death's-Head.—We have not named this specimen, as it differs so much in size, and in some respects in appearance, from others in our collection. The caterpillar was found on a Caladium leaf in our garden on 17th September. It was then about three inches long, smooth, of a grass green colour, with seven whitish diagonal lines each side. At the head end it had two peacock blue eyes in yellow spectacles, at the tail end a fulvous tentacle. It had its first encounter with the caterpillars of *Danais chrysippus* on 19th September, and its second on the 24th. On the 25th we found it trying to bury itself, and suspended it from the roof of the cage as already described. There we left it when we started for Mahableshwar on 11th October, but found on the 27th that the moth had emerged in the interval. In general appearance it resembled the largest specimen of the family (*Acherontia styx*) in our collection, that is to say, its forewings were of a dark mottled brown, paling to yellowish, faintly clouded with white at the tips, and its hind wings were yellow, marked with brown, while its body was dark purple with a narrow longitudinal streak of yellow on each side, an six black transverse rings. But it was far inferior in size, measuring barely four inches across the outspread wings, while the other was nearly six, and the skull mark was brown instead of white.

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* This theory would seem to derive some support from a beautiful experiment by Mr. Poulton in 1887, showing that the bright surroundings of larvæ kept in a gilt-lined box favour the production of golden pupæ.

Saturnia mylitta.—These were found on *Zizyphus jujuba** in our compound on 4th September. When brought in, one had already completed, and another was just completing, its cocoon. The third had just begun to spin, and finished on the same day. The fourth, which was still in its larva stage and feeding heartily, was rather more than three inches long, sparsely haired in tufts, somewhat deeply jointed, and very thick in proportion to its length. It was bright green in colour, with a triangular dark brown mark near the tail, its apex pointing forward, and a yellowish line running from it to near the head. On this line, at the head end, were two bright gold spots, and below it, between each pair of legs, a small oval orange spot with brown edges. About the head were a few small orange spots, and one rather larger dark brown. It cocooned on 5th September. The cocoons were a pale whity brown colour, egg-shaped, about two inches in length, and suspended from the twigs of the leaf plant, two or three leaves of which were drawn down on to the sides of the cocoon. They opened, at the upper end, the first on 21st September, the second on the 22nd. The moths from both of these were males. The two other cocoons opened on the 25th September, and the moths from them were females. All through the night of the 25th September we suffered from a regular plague of tussore moths attracted into the house by our specimens. We caught twelve of them, all males, some with their wings in so tattered a condition that the wonder was they could fly at all. During the next day one of the females laid a number of eggs in clusters on the twigs of the food plant in the cage. The other laid none. Whether it would have done so had we waited we cannot say, for to avoid a repetition of the previous night's invasion we got rid of all our specimens before dark, and were left in peace. As we were shortly leaving Bombay, we did not try to raise any caterpillars from the eggs, but put them out on a *Bear* tree in the compound to shift for themselves. The caterpillars seemed to be earlier this year than last, for a single caterpillar that we secured in 1888 did not cocoon till 4th October. The cocoon did not open till 5th November, but this may possibly have been because we took it up to Mahableshwar with us.

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* Native name *Bear*.

Of the unnamed moths No. 1 was found on 13th August in our compound, on a wild brown-speckled arum that comes up in profusion in the rains all through the jungle on Cumballa Hill. It was smooth, pale green, with a long black tentacle at the tail, and near the head two grass green eyes edged with bright yellow, below which were two yellow spots. When found it was about 2½ inches long. It chrysalised in earth, but scarcely going beneath the surface, on 16th August. The imago appeared on 4th September, a large female moth of a general pale ashy brown colour, with broad bands of darker brown across the wings. The forewings were deeply scooped along the inner margin, and both fore and hind wings were scalloped along the posterior margin. The body, which was very thick, was ringed with five fine transverse white lines. The pectinated antennæ were deeply hooked at the ends. Two males, attracted into the house from outside, were also secured on 5th September. The female laid a large number of eggs singly about the roof and walls of the cage on 6th and 7th September, almost all of which were hatched on 13th. The larvæ were pale yellow with a tentacle of the same colour, very long in proportion to the length of the body, at the tail end. We were unable to rear any of them, as the food plant had unfortunately withered after the rains.

Nos. 2—6, small hairy caterpillars, dark brown, slightly marked with yellow and red, and so thick-bodied towards the head end as to present a somewhat "hump-back" appearance, were found on 14th August on *Ficus heterophylla*,* on Cumballa Hill. They assumed the pupa form in loose cocoons of yellow fluff in cones of brown paper on 22nd August. The imago of one appeared on 3rd September, and of the others on the 4th. The moth, thick-bodied, and with pectinated antennæ, was about an inch across the wings, very downy, yellow, with two black spots near the tip of the forewing, and one near its posterior margin. It is a very common one in the house during the rains in Bombay.

In concluding these notes, we could warn the reader to be cautious in using the native nomenclature, which is apt to be a little indiscriminative, at least among those ignorant persons of the lower orders who are most likely to be employed to assist in the work of a caterpillar farm. For instance, we found the name *Asok* freely bestowed on several sorts of trees besides the *Guatteria*. So, too, *Karunja* seems to be used indifferently for a thorny bush with a blue berry and a thornless tree with a flat round pod. While *Zizyphus jujuba* is called by some a *bear*, and by others a *boar*. But the strangest difficulty we had with names was in regard to the caterpillars themselves. Native opinion seems to be divided as to whether a caterpillar is a centipide, scorpion, spider, devil, worm or something else. Hence on enquiry in different quarters, we were differently informed that the name of these janwars is saturi, bichu, makra, bhoot, kiri, or kushrun. On the whole the worms had it. So our pets were generally known as kiri.

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* Native name *Karowti*.

"DOWN THE COAST."

By. W. F. Sinclair, C.S.

(*Read at the Society's Meeting on* 12*th November* 1889.)

On a former occasion I described to you a voyage to the Isle-fort of Janjira by the creeks. It is a good terminus; and I propose, to-day, to re-visit it by another route, indicated by the title of this discourse, and starting from Alibag.

We must on this occasion suppose an early spring tide and start, as for our last trip, a little before high water, say, at 9 A.M.

Our place of embarkation is a long sand-bank, so low that the highest monsoon tides sometimes wash over it, and covered with innumerable shells, all dead and worn, but many still entire, and often much more beautiful in decay than they were in life.

Behind this is a little lagoon, filled by the rising tide, and then a few hundred yards of sand, green here and there with wiry shore grass, and backed by a long line of palm orchards, like Mahim Woods. Like these, too, they contain a population of some thousand souls; and my reason for bringing them particularly to your notice is, that they cover what was, within recent history, exactly such a bank as that from which we sail. Their lagoon is now a salt-marsh in course of transformation into rice-fields, and if, as we suppose, the thing that has been is that which shall be, the sand-bank of to-day will be the town and garden of another generation. I wonder if it will read this prophecy there.

On our left, or landward, side, as we face south, we see the line of the palm trees stretching some seven miles, till it seems to stop at the foot of a range of wooded hills, some 800 feet high, ending to the seaward in a low fortified peak, whereof we shall have a better view later in the day. Due west, upon our right hand, the Isle-fort of Kolaba, at this state of tide, rises apparently sheer from the water, a range of crumbling fortifications, about twenty feet high in most parts, topped by abundant foliage, including that of a few palm trees, and varied by a couple of temples.

Over the highest northern tower a tall white flag-staff, with a square yard, shines in the morning sun like a silver cross. This marks the warning-signal station, where watch is kept day and night in favour of the traffic of Bombay. It has saved many vessels and many lives; and I seldom see that cross in the sky without a mental quotation of the "*In hoc signo vinces.*" But it is not always victorious; and on one very recent occasion its warning was not attended to in time to prevent a serious accident.

All round the fort, and beyond it for miles, the reefs lie hidden under the flood-tide. Only to the southward, and almost on our course, a black tower, rising straight from the water, marks one of the worst—the Chaul Kadu reef. Just by its foot an occasional wave breaks on the almost forgotten wreck of the P. & O. steam-ship "Jeddo."

Close before us the breach of the sea marks a sand bar forming the other side of the creek, and we being by this time embarked, steer to cross it, where a cocoanut stem marks the passage over the bar.

This, just at present, is in use as the perch of a sea-eagle (*Haliœtus leucogaster*), who is so well aware that we will not hurt him, that he lets the boat come close enough for us to see his eye, and admire his snow-white head and breast, contrasted, sea-gull-like, with a slate-grey back and wings. Then, rather as despising than fearing our neighbourhood, he lazily flaps away upon over a fathom of wing.

Half-a-dozen handsome black and white birds head across the bow, and the men look to the stern sheets as if they expected the shot to be taken; but it is not well to spend time in shooting on this trip, for we want all our daylight. These are Oyster-catchers,* or

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* I have in a former number noted the apparent error in Jerdon's *Birds o India*, where the truncated beak, so common in European Oyster-catchers is noted a a *generic* distinction. I have examined many specimens in the British Museum and here, and now believe it to be only the result of wear, having never found it in my Indian specimens. None of these have the completely red bill of many European birds, the coloration is that described by Jerdon, orange with black tip. Further Indian observations are required.

"sea-pies," which abound here. Some remain all the year round, and probably breed on the sandhills of the shore to our left.

Further out, a flock of ducks are wheeling over the water as if looking where to alight, and they pass near enough to be recognised by the white wing-mark as "White-eyed Pochards," the commonest sea-duck hereabouts. By this time we have poled out of the creek against the tide, and set our sail to a light land breeze, which wants the help of oars to move the boat, and will presently die away in "cat's paws."

But by this time we are well clear of bank and reef, and have already found the ebb tide running down the coast at the rate of nearly three knots an hour; and this, with our oars, carries us down some six miles, till we pass within half a mile of the fortified point mentioned before.

This is Korlai, or "Castle Curlew," once known as the "Morro of Chaul" to the Portuguese, who took it by storm from the kings of Ahmednagar, pulled it down, and rebuilt it. Inside and north of it we can see the opening of a great creek, full of native shipping, and flanked on the other (north) side by an extensive European fortification. This is the Agarkot, or "garden fort" of Rewadanda, once a walled town crowded with palaces, convents, and the other incidents of Portuguese colonization. It now contains little beyond nuts and trees, mostly cocoanut palms, which hang over the ruinous ramparts. Only one tall Franciscan tower shows itself above the palms, a mere shell, and covered with vegetation, but still erect.

A fishing boat running for the port answers our hail with a yell of "Waghade"="Tigerlings," which is rather good news, as these are not named from their vice, but from their stripes, and are, in fact, Mackerel (*Scomber microlepidotus*).

They are not so large as the English ones, but quite equal in quality, if properly cooked while fresh, and we can have more than enough for our whole ship's company for a rupee. By way of variety, we take the change in sardines, which are commonly in season here along with the mackerel, and much better than the tinned article. Our cooks mostly know how to treat them *à l'huile,* which is the classic method; but at present they may go on to the gridiron along with the mackerel, and, just in time, the forenoon calm of the tropic coast gives way to the sea-breeze and the oars can be got in, which leaves space for getting breakfast ready, as we run down the shore of Little Ethiopia (Habsán).

This would naturally have begun at Korlai, the southern point of the mouth of the Kundalika, as that river is the "March burn." But the powers that have in succession held Chaul harbour (which we now commonly call Rewadanda) have always made a point of having both sides of it, and we, like the Marathas before us, and the Portuguese before them (and so on backward), hold both banks at the mouth.

The coast, however, seems rather to protest against this political arrangement. As we pass clear of Korlai it changes in character.

The hills, which on the Alibag coast were several miles inland, now close upon the sea in solid rank; the yellow sands are only in patches along the black basaltic shore, and but few palm trees adorn the first port we pass in Janjira. This is Borlai, quaintly named after the dwarf-ringed-plovers (*Ægialitis*) of the shore, as its neighbour Korlai, after the curlew.

It is a tolerable fine-weather port, but beyond it, the wooded hills come down to the sea, ending in low cliffs running out to the point of Dandi. All this while we are deepening our water, for the bottom of the sea has changed as much as the beach, and so we find ourselves amongst neighbours who at Alibag were in the offing, and only occasionally close with that shore. The sardines have come up from the south in force, and the scene is lively enough.

Every here and there we can see gulls and terns fishing, though this form of bird-life is not so abundant here as at home. Occasionally, a little crowd of them marks the presence of a shoal of sardines, on which they are working, or a rough rippling patch, the play of a school of mackerel. Scabbard-fish and garfish, like little silver arrows, frequently leap close to the boat, or scramble out of her way along the surface, and one or two actually jump into her and slip through the kit stowed amidships into the bottom.

The large Dolphins (gâdha) are alive all round, rolling, plunging, and cutting somersaults amongst the sardines and mackerel; and just as we are watching one very lively group to leeward, there is a strange snoring sound behind us, and a cry of "Deo Mâsa" among the crew, one or two of whom raise their hands in salute.

We turn just in time to see the last of a great black object half a mile away, but the whale—for whale he is—must rise again presently, and if he keeps his course under water, will rise quite as near as we care to see him; and "there he blows" again, sure enough, at little more than a cable's length. He is apparently a small Fin-back, or Rorqual, perhaps 40 feet long.

You notice that he does not "spout" as whales do in pictures and poems. The fact is that no whale habitually spouts water. But in northern seas the hot-water-laden air from his lungs is condensed by the colder atmosphere into a cloud of steam, or even drops of water. Here and now the air is as warm outside the whale as inside him. Wounded whales do certainly sometimes spout blood, and I suppose that a sick one might throw up other things besides ambergris and Jonah; but colds in the head and bloody noses are no more normal to whales than to ourselves, though probably plentier than prophets or perfumes. Again our whale rises, and still nearer; but as he disappears we see for an instant his tail in the air. He has seen more of the boat than he likes, and will change his course, of which I am not sorry, liking his room better than his company, since we are not in the way of boiling him down. He has accompanied us past a mile or more of very inviting looking sand; but we know that it is fringed all along with reefs dangerous even to our small craft. Behind it the wooded hills rise steep, and it ends in a head land, bolder and more picturesque than Dandi, with high detached crags—Adi Point. A little beyond this, however, the hill recedes in a great crescent, and Nandgaum Bay shows again the familiar long line of palm-trees with their edging of almost white sand.

Yiúr (or Vihur) Point, beyond it, is bluff and wild again; but rounding it, we come in sight of a great bay, evidently leading far inland. In fact we know of old where it goes, for right in the middle of the narrow waist of it stands our old acquaintance, the sea-castle of Janjira; and we have just been signalled as rounding the point by the nearer and smaller isle fort of Kansa, a sort of calf to the great fortress, which we pass under the salute. The tide has turned these two hours, and the boat is going up the bay at a speed of probably five knots an hour, heading for the far end of a line of cocoa palms on the north side, faced with many white buildings. This is Murud, the working metropolis of the State under its present ruler, who has given up living on a rock in the water like a garefowl on an "All-alone-stone," as his ancestors did.

The apparently unbroken line of white foam before us is on the bar, and it makes a man hold his breath as the boat rushes before flood tide and sea-breeze into an opening that seems scarce wider than herself. Instantly the helm goes down, and she comes up almost into the wind, and as quickly falls away again into the next bend of the channel. Seven times must the helm be shifted in a cable's length of that pass; but with the seventh turn we float out of the foam into a deep, calm, little harbour, where the palms hang almost over the water, and our trip down the coast is over.

THE INDIAN BISON, WITH SOME NOTES ON STALKING HIM.

By J. D. Inverarity.

(*Read at the Society's Meeting on 1st October* 1889.)

My first introduction to the Indian Bison was in the pages of "The Old Forest Ranger," when I was a very small boy. My youthful imagination was so excited by the account of the bull, who is there described as coming on at headlong speed, his tail on end, his bloodshot eye rolling in the frenzy of madness, his tongue lolling far out of his mouth, and the white foam flying from his distended jaws, that I there and then determined that when I grew up I should do little else than shoot bison, and though circumstances have prevented my carrying out that intention to its fullest extent, I have spent several hot weather vacations in the pursuit of that animal; and I propose in this paper to give a brief outline of its habits, supplemented by some observations as to the mode of bringing him to bag. Sportsmen in the early part of this century do not seem to have known much about bison. No mention whatever is made of him in Captain Williamsons "Field Sports," the second edition of which was published in 1819. In Dr. Johnson's Sketches of Indian Field Sports, he says "there is also another species of animal in Ramghur called Gour, a kind of wild bullock of a prodigious size, not well known to Europeans. I have never obtained a sight of them, but have often seen the prints of their feet, the impression of one of them covering as large a space as a common china plate!"

In the *Oriental Sporting Magazine* of July 1829, there is an account of what was evidently Biscn shooting under the title of "Bffalo Hunt," and the quarry are alluded to throughout as

"buffalo." In the May number of the same Magazine for 1831, a correspondent gives an account of bison, and remarks "I allude to Bison, which some maintain to be a wild buffalo and others the common cow in its natural state, from both of which animals it is quite distinct." The first sporting works which, as far as I know, dealt with bison shooting, are the "Old Forest Ranger" and "My Indian Journal," both by Campbell of Skipness. Since then numerous sportsmen have described their experiences of bison in print. The best and most reliable accounts to my mind are to be found in the "High lands of Central India" and Mr. Sanderson's book. None of the illustrations of bison in any of the published books give even an approximately good representation of what a bison is like. The best I think, is the one in "My Indian Journal," but it errs in exaggerating the thicknes of the withers. The legs also are wrongly coloured. They are shown as being white from below the knee, whereas in truth the white stockings on the legs begin from the top of the knee, an in the hind legs from the point of the hock. The same mistake is made in the picture of the Bull Bison in Mr. Sanderson's book. The white legs are correctly shown in the illustrations in the "Highlands of Central India" and in "Seonee." I have several photos here of bison which prove what I say as to this. The only other ruminants that I know of with white legs are the wild buffalo and the old buck of the Sinde ibex (*Capra ægagrus*), the white of their legs begin in exactly the same spot, which is a curious circumstance. Jerdon's description of the bison, which I need not repeat here, is a very good one, except that he says "legs from the knee downwards white," whereas it ought to be "from above the knee downwards." There is a stuffed bull and cow bison in the Natural History Museum at South Kensington, but they are poor specimens. In genera appearance the younger bulls look a dark coffee brown the old bulls look jet black. An old cow also sometimes looks almost black. A very young calf is a light yellow, though they soon get brown. The most noticeable feature about the bison is the extraordinary development of the spinous processes of the dorsal vertebræ, usually known as the dorsal ridge; the spinous processes continue all along the lumber vertebræ, but are much smaller behind the termination of the dorsal ridge. The dorsal ridge is formed by a row of single bones springing from the back-bone immediately behind the junction of each pair of ribs of which the Indian bison has 13 pairs. They slope backwards. The height of the dorsal ridge at the highest point above the backbone in a skeleton that I measured was 15 inches, but I forget whether this was along the bone, which as I have said slopes backward, or vertical measurement. The highest point was about the 5th or 6th rib, the exact spot I omitted to make a note of. The height of the dorsal ridge at the highest point above the line of back of an animal in the flesh looks about 5 or 6 inches only. The dorsal ridge terminates abruptly at the last rib. I have said the Indian bison has only 13 pairs of ribs, which is the same number as are possessed by domestic cattle. In fact naturalists tell us that the Indian bison is not a bison at all; but belongs to the Taurine group. The Bisontine group comprises the bison of Europe and North America, the Musk Ox and the Yak. The European bison is stated by Jerdon to possess 14 pairs of ribs. The American bison 15 pairs. I have here a photo of a bison skeleton cleaned by vultures, the remnants of skin and flesh sticking to the bones prevent the details being so clear as they would be in a photo taken from a skeleton properly prepared.

The foot in shape and appearance is like a deer's, though of course larger. It does not, however, approach the size of the common china plate mentioned by Dr. Johnson. It is probably the smallest foot of any animal in proportion to the size and weight it has to support. The forefeet are rather larger than the hind feet. The eye I should describe as brown, though all books state it is pale blue. It is true that when the light falls on it at particular angles it looks a beautiful blue. This is caused by the tapetum lucidum, a membrane behind the eye-ball of a lovely peacock blue colour. It is this membrane which causes an animal's eyes to shine in the dark. In the human eye it is opaque and black. The bison has no dewlap, although the skin of the neck about half way down the throat suddenly gets thicker and in some old bulls looks like the beginning of a dewlap. The head has also certain peculiarities, the forehead being concave, and the top of the skull rising in an arch above the base of the horns. The face in profile shows a distinctly aquiline and ram like nose. Most stuffed heads fail to reproduce this. The height of a bull bison at the shoulder in the Central Provinces in my opinion does not exceed 5ft. 9 in. or 5ft. 10. I have shot many very old bulls. I have only measured the height when they struck me as particularly large, and the largest measured 5ft. 9½ inches. He was a coal black bull, with horns broken, and very blunt at the points, sticking out almost horizontally, with hardly any curve. The measurements were:—Widest span, 38½ inches; between the points, 34 inches; round base, 18 inches; right horn in length, 24 inches; left horn, 22 inches. It is not easy to measure the height accurately. The distance between a stake driven in at the shoulder, and another at the heel of the forefoot is the proper measurement to take. To the top of the dorsal ridge is of course some inches higher. I have not measured a cow, but they are, I should judge, a good 4 inches less. Measurements given in most of the sporting books run to 6 feet and over. I do not believe any such are to be found in the Central Provinces, though I quite believe that in Southern India they may attain that size. In fact I saw once on the Annamallay Hills an enormous bull that looked well over 6 feet. He was lying with a herd out on the green slopes of the hill at an elevation of between 6 and 7,000 feet 200 yards clear of the forest, and was the biggest bull I ever saw, with a very wide head, but I failed to get near him. The heads I have seen from Southern India are much finer than the Central Provinces heads. The horns in the latter, as a rule, do not spring up so high from the head as the former ones. The curve of the horn seems to me to be lower, as will be seen from the following measurements of the vertical line drawn from a line between the tops of the horns and the top of the skull of 5 bulls, the other measurements of the heads are also given in inches :—

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5
Widest	31	33¾	32½	32	31
Length, Right	22½	24¾	26½	24	25
Do. Left	26	24¾	25	23¾	26
Between Points	28	22½	17½	20½	20
Round Base	17	16	15	15	14
Vertical height of horns above skull	8¾	9	7¾	7¾	9

Nos. 1 and 3 were solitary bulls. No. 2 was with a single cow. No. 4 was shot out of a large herd. No. 5 was in company of a bull and a cow with a malformed head; see head No. 7. Though I have shot better bulls, the above are all good heads for Central Provinces bison. The longest horns shot by me were 29½ inches, the widest span of this head is 33 inches, and 18 inches round the base. The thickest horn I have measured, was 19 inches round the base. It should be remembered that the measurement round the base of the horn is more when the animal is just dead, than after the head has been thoroughly cleaned and got quite dry; there is a good deal of fleshy matter between the horn and the bony core, when this is removed, and the horn gets dry, the base of the horn shrinks. All the above measurements are from dry heads. The measurement round the base of the horn would be about an inch more in each case when the animal was killed. The horns of the cow bison are much smaller and thinner than the bulls, and they have a narrower sweep of horn. The tips of their horns curve in sometimes very close together. I have a photo. of an ordinary cow and a malformed cow's head; they are numbered 6 and 7. The latter head is a very curious one, the bony core is only a few inches long, and does not extend up the horn as usual. The measurements of the malformed head are—Widest span, 33; length, 22; between points 26. The head of a bull procured from Travancore in the possession of this Society measures—Widest span, 43; length, right horn, 31½; left horn, 30½; between points, 29; round base, 18; vertical height of horns above skull, 12½.

It would be hard to get a better one. It is No. 8 in photo., and is taken on a larger scale than the photo. of the other heads.

Bison are essentially a mountain animal, though they will often be found in the low jungle in the proximity of hills; they go in herds arying in size generally from 20 to half a dozen. The old bulls lead a solitary life. I have only once seen a young bull by himself, but two young bulls together are common; they are generally not worth shooting. A cow is sometimes seen alone with her calf, the latter being a few months old. Large herds of cows and calves without any bull at all, and herds without a good bull, are common. Sometimes an old bull, which according to custom ought to be solitary, is found with a herd, especially if the herd is a large one. Mr. Sanderson says he has never found a really aged bull with a herd. I have shot very old black bulls with rugged heads out of herds. Head No. 4 is an instance in point, and the biggest one I ever saw was in a large herd. No doubt old bulls are generally solitary. A solitary bull has always a good head, so you may be sure when you get on his tracks that he is worth powder and ball. The points of an old bull's horns are invariably worn, broken and blunted at the points. The horn, however, grows again and makes a fresh point in the middle of the blunt end; see heads Nos. 1, 2 and 4. The calves in my opinion are born at all times of the year, though it is said that most are born about the end of the rains. I have seen young ones of a few days old in May and June, and the calves one sees then appear to be of all ages. I was once in the beginning of June tracking a herd, and came on a calf crouched in the long grass. The mother had gone on with the herd and left the calf concealed behind. It was sitting with its head and neck stretched out close to the ground, trying to make itself as invisible as possible. I succeeded in taking a photo. of it at a distance of 3 yards: all the time I was fixing the camera, it kept its eyes on me. On my moving the camera to take a second picture from another position, it got up and bolted, and seemed to be a fortnight old. It was of a light yellow colour, and exactly the same colour as a calf of the American bison I saw in the London Zoological Gardens last year, which the keeper told me was then a fortnight old. I then continued tracking the herd, and saw the calf again two or three times until I passed it in some long grass. Whether by accident or instinct, it followed the tracks of the herd. The end of it was that the herd after a circuit of a couple of miles returned to the place where the calf had been left sitting, but I did not fire at them, as there was no good bull. Bison never leave the jungle, and are impatient of civilization. They do not mind the few huts dignified by the name of villages that are to be found in the forests. I have often found their tracks within half a mile of such spots; they are naturally timid and flee from the sight of man. In my opinion they are not at all dangerous game. The ground one attacks them on is well wooded and affords every facility to the hunter for dodging them, should they charge. This, however, they seldom do. I have only been charged myself thrice: once by an old solitary bull that I had wounded the day before, once by a bull in a herd that was so badly hit he had no other means of escape, and I was close on him, and once by a cow with a young calf. The last two instances ought not to count, for

"The smallest worm will turn being trodden on,
And doves will peck in safeguard of their brood."

My brother was charged by the first bull he ever saw. It tossed his shikari, the point of the horn scratched the skin on the inside of the thigh. The man fortunately fell into the bottom of a nullah; the bull did not go on, but stopped looking about for his adversary, and was then killed. The shikari, though not hurt, said he had had enough of bison-shooting and would go home. The natives show considerable fear of bison, and give them a worse character than they deserve. An old bull I once shot I was told had killed a native a short time before. When a bison charges, he commences by running at you with his head well up, and nose in the air, and only tucks his head down when a few yards off. At least that was the way the ones that charged me behaved, but the instances are too few to generalize from. I only once found two old bulls together. When the largest received my fire, he rushed at the other one and they began butting each other like a pair of billy-goats. On my running up and firing the second barrel, they made off, and I eventually bagged the one I fired at. The second one left the wounded one immediately and went in a different direction. The bull that charged my brother came on with a series of snorts; the others were silent when charging. A herd never charges; on one occasion a herd of over twenty, when I fired, came in a compact mass straight for me. I had to fire the second barrel into the brown of them when ten yards off. They opened out and passed close on each side; the last one, a good-sized bull, nearly ran over me, but on my shouting at him he shied violently to one side. This herd had not the slightest intention of charging, but were merely bolting. They were down in the bottom of a nullah at a waterhole, and when I fired, fled out by the path they had taken down, and as I had tracked them to the spot, I was right in their way. I found the next day, some miles off, a cow with a broken shoulder, the result of my shot into the brown. The bone must have given way after some time, as there was no sign of any wounded one at the time. The bull, I first fired at, I never bagged, though I saw the bullet hole, from a 12 bore, behind the shoulder, though too high. I do not think bison drink every day. A solitary bull I followed for three days, and that I wounded the first day, did not go to water that night, or on the second day at all, as I was on his tracks the whole time, and saw him at sunset of the second day, I am sure of this. He drank on the morning of the third day. I was two and a half hours after him the first day, eleven hours on the second day, and ten hours on the third day, twenty-three hours and a half in all steady tracking. On the afternoon of the second day he went back over exactly the same ground he had come the first day. For several miles he took almost the identical old route, descending the nullahs at the same spot, and at sunset I saw him within a few hundred yards of where I had first fired at him, 26 hours before. This seems to show that a bison frequents a particular jungle. On the third day he went straight away for several miles in a different direction. I ought to have got him, but did not. I was several times close to him in long grass, but he only once made any attempt to show fight, and then sheered off on being fired at without charging. Bison generally lie down about 10 A.M., but sometimes they do not appear to lie down at all, especially if the day is cloudy. I have seen them grazing at all hours of the day. I have found them at water in the morning, middle of the day, and afternoon; though they usually drink in the evening or early morning, I have tracked both herds and solitary bulls from early morning, and only came up to them late in the afternoon and found they had never lain down, though this is not common. There is nothing that teaches you the habits of animals better than wandering through the jungles stalking. If you keep your eyes open, you get a good knowledge of the favourite haunts of tigers, panthers and bears, which you can turn to good account in future years; but when stalking, I think it is advisable to stick to it. If you are after tigers leave stalking, except perhaps an occasional day, alone. Moreover, in the extensive jungles which bison love, although there are plenty of game killing tigers, &c., they are more difficult to come to terms with, than the cattle killers on the borders of cultivation, where you will not find bison. One of the charms of bison stalking is that you frequently come across sambur, cheetul and in the sal forests swamp deer and occasionally larger game, and can without detriment to your sport fire at anything you feel inclined to. In my opinion a bison is not disturbed by a shot unless fired within half a mile of him, and if he is alarmed by a distant shot, he does not go very far. In the hot weather most of the stags have shed their horns, but a small number still carry their heads. When tracking bison I always fire at a good stag, if I come across one. The small four-horned antelope you can also knock over, and keep yourself pretty well supplied with fresh meat. It is good practice to shoot them running. Bears are often seen in the early morning and in the evening among the bison hills. I have shot more than a half-a-dozen when stalking; once I bagged a tiger, and have seen others, and have also had shots at panther. Pig and neilgai you will also see, but it is no use firing at them. The ground is generally quite unrideable. You cannot afford to run the risk of laming your horse. I once speared an old boar the same morning I shot a bison, but he got away into a steep ravine on the edge of which I speared him. In the sal forests bison and buffalo are found on the same ground. I have shot both on the same day. Such red letter days are few and far between, and there are many blank days on which you see nothing. I have been ten days out from morning to night without a shot, although I might have had two or three shots at small bulls, had I wished, so you must not run away with the idea that you have only to walk into the jungles and shoot. A great deal of hard work and perseverance is required before you lay the bison low; but there is always a pleasure in the pathless woods which never palls, even though the silence is not broken by the crack of your rifle. You require to make little or no arrangements when you go stalking; I always take a small tent, though it is quite useless. Unless it rains, I never go into it. It is much cooler under a tree. The less following you have and the smaller you can make your camp the better; the jungle villages are small, the belongings of its few inhabitants are not sufficient to cope with the demands of a large camp. They have only enough for their own needs, and they do not care to sell you what they want for their own use. They are very obliging, and will do what they can for you in the waw of milk, &c., but the way to be popular and get sport is to interfere with them as little as possible. You do not want shikaries. Every jungle man is a born tracker. If a man likes to come with me I do not object, but as a rule the native has an unconquerable aversion to leaving his lares and penates, so you get fresh men at every camp. For anxiety to please you, hard work, endurance, and cheerful interest in your sport, the simple native of the jungle takes the first prize. Many of them are thoroughly imbued with the sporting instinct, though they never can understand why you do not fire at does and cows. A doe sambur they consider excellent material to fill their stomachs with, and when they see a prospective dinner cantering off unharmed they are much disgusted. This is their only failing. It is a mistake to get up before sunrise, the day is quite long enough if you get up with the sun, at about 5-30. A.M. Having taken a cup of tea or coffee, and a basin of porridge and milk, you ought to be under weigh at 6-30 A.M. Take plenty of water with you, as under a hot sun, when the water is finished, you are soon *hors de combat*. Each of your men will carry his own water gourd, but it is advisable to take for the men a couple of chatties full of water which one man can carry slung to each end of a bamboo. This is generally a great scarcity of water in bison ground, the water holes being few and far between, the animals wander miles from water, and you may not see any water all day. I always have two large chaguls full of water carried for myself, and have sometimes found I had an insufficient supply. It is important to see to the supply for your men, as they knock up very soon when the water is done. You will want little to eat during the day. Under a burning sun one has no appetite for dry food like cold vension or a tough fowl. Biscuits are an abomination. Cold bison tongue is juicy and good, so are tinned sausages and sheep's tongue. Preserved green ginger is a great pick-me-up, and I always take some with me. Pickled white onions are also a stand-by. These will be carried in a large leather bag which will also hold your skinning knives, tobacco, reserve of cartridges and any other little things you may fancy you want. Never carry a knife on your belt; it is quite useless. I always carry my field glasses on my belt and not slung over the shoulder. They are then always at hand, and you can drop them back into their case in a moment. Half-a-dozen cartridgres on the belt, and as many more in your pocket will be enough. A reserve of another dozen should be in the bag. Thus accoutred you will sally forth on horseback, accompanied by half-a-dozen men, of whom two will carry the water, one your bag, one the camera and two your battery. You will first have a look at the water hole near your camp (for you always camp near water), and if there are no tracks there, you will leisurely proceed through the jungle to the next water, which is perhaps several miles off. One man, carrying your Express rifle ready loaded, will walk immediately in front of your horse, the others behind. You may very likely put up or sight a stag or four-horned antelope, and can at once dismount and fire, or take a shot, which is generally unsuccessful, from horseback. As you proceed you keep a sharp look out for deer and for tracks, and are often disappointed by finding what at first sight appear to be fresh tracks turn out to be a day too old. You may wander about in this way all day and see neither hoof nor horn or animal of any description. The jungle man with subtle flattery will account for this by telling you that having heard your Honour's name they have fled. On other days you will see stags that have shed their horns or small parcels of hinds, or get on the tracks of a herd that after hours of tracking you get up to only to find that there is no head worth shooting in the herd; but at last the fresh print of a gigantic solitary bull will gladden your eyes, and in that case, if it is not too late in the day to come up with him, it is your own fault if you do not bring him to book. With a little practice the track of the day is easily distinguishable from the track of the day before. Where the ground is bare it is as hard as iron, but there is always a layer of dust on it which takes a clear impression of the foot; in the middle there is a slight ridge of dust pinched up by the cleft in the bison's hoof. If this is sharp, and the whole impression is clean looking, it is a fresh track. If a footprint has a blurred appearance, and the edges not clearly defined, has tracks of insects across it, or in short has a dirty appearance, it is an old one. If you point to a track and ask your men if it is to-day's; when it is an old one their reply always is "maila hai," it is dirty; and I know no better description of the difference between a fresh and old track than the one is clean and the other dirty looking. On softer ground the difference is easily distinguished. In long grass I for one cannot distinguish between a one day old and a hour's old track, without following it for a little way, when other signs, such as the withered or fresh appearance of the ends of grass dropped out of the bison's mouth when feeding, &c., soon let you know what sors of track you are on; the alternations of hope and despair when you are on a doubtful track, and see or fancy you see signs that you are all right, and again see signs which lead to a contrary conclusion, can be imagined but cannot be described. Half a mile's tracking out to solve the question. If there has been dew during the night, you will in the early morning find a drop at the end of each blade of young grass where it has been cropped if the track is a day or more old. I will suppose however you have found a fresh track. You will at once begin to hope that the next hundred yards will bring you in sight, and although you know from experience that probably many miles have to be traversed before you come up to your game. you can never get rid of the idea that you will see him in the next ten minutes, so that however long the pursuit, there is no weariness in it. As tracking is half the fun, you should track yourself, but good at tracking as you may become, or good as you may fancy yourself, you will never equal your humble companions at this. After some hours' tracking the glare is rather trying to the eyes but they soon get used to it. You do not go very fast when tracking, and you have plenty of time for looking about you and ahead. Taking every thing into account, and including short stoppages, I do not think the average pace of tracking is more than 1 to 1½ miles an hour. Though some bits are done at twice that pace, at other times you can only follow the track with difficulty or lose it altogether for a time. Should you lose the track, make a cast forward while your men try and puzzle it out. A bison generally goes by the easiest way in crossing hills, a knowledge of which fact often assists you in recovering the trail. Two men only should be with you, and you should always carry the rifle yourself. The rest with your horse will follow on the tracks on their own account 3 or 400 yards behind. The water man, however, I keep within 100 yards, as you constantly want to have a suck at the water. It is impossible to know when you will come up with the bison, even when the tracks are quite fresh, and they are apparently not more than a few minutes or half an hour ahead; they may keep walking on for hours as fast or faster than you track; on the other hand, although the signs on the spot you have reached show that it must be some hours since they passed, they may have lain down a short distance in front, and may be close at hand. Every two or three hours it is pleasant to sit down for a few minutes in the shade and have a smoke, but the ardour of the chase soon drives you on, till suddenly a loud snort and a rush announces that the bison have seen you first and are off. If you can make out a good bull, and he is broadside on, take him running, and if he is within a 100 yards you ought to kill him. If his stern is to you do not fire. Unless the jungle is pretty open, it is not easy to make out the bull. Never fire a chance shot, which can only result in some wretched rubbish of a young bull or worse still a cow being hit. If you do not fire you continue tracking, and you may be sure as a rule two or three hours will elapse before you see them again. The tracking will be easy for a mile or two while the herd has been galloping. They then pull up and go on a steady walk for miles, and your chances of a shot are much less now than when you began, as they are on the look out and difficult to approach. They sometimes sit down again if the day is very hot; on a cloudy day they go much further. A solitary bull when disturbed by seeing you does not go so far as a herd will before stopping; he too will sit down again on a hot day. If bison have not seen you but only winded you, they stop sooner. If you fire at them it is no use going after them any more, as they will usually go many miles before stopping, and the day is too short to come up to them again. If, however, the bison are not lying in long grass, you ought to see them first: a herd will be found sometimes standing, sometimes lying down; your attention most likely is first attracted to them by the flap of a ear or the moving of a tail. It is astonishing how the least thing moving in the jungle attracts the eye. They will probably be about 200 or 300 yards off, as you cannot see very much further in jungle. I have generally found them easy to stalk, the only difficulty being to find the bull and get to him without being seen by the others. A solitary bull is quite easy to stalk if he has not seen you. According to my experience their eyesight is more to be feared than their nose. Capt. Forsyth expresses the contrary opinion. The air is frequently quite still, and the grass and trees I think diffuse and dissipate the taint your presence gives the wind in a much shorter distance than would be the case in open ground. Even if you are tracking down wind they seldom bolt till you are within 300 or 400 yards, and you generally hear them making off. The best way of finding out from what direction the little wind there is coming from, is to lick the palm of your hand, and turn it slowly round; a cold feeling will strike it directly it meets the wind. Of course if there is a nullah or any large rocks which will conceal you, take advantage of them. If not it is a mistake to crouch; remain erect with the arms close to the body and the legs close together, and stand perfectly still if the bison turns his head towards you. It is of the utmost importance to keep the arms close to the body and the legs close together, when advancing or standing. All sudden movements should be avoided. If a bison looks up at you when you are stalking him, you must remain absolutely motionless in whatever attitude you happen to be. An irresistible longing to scratch my nose always seizes me on these occasions. If he is unsuspicious you advance slowly, keeping a tree if possible between you and his head. You should always make a stalk alone. A native always points to the nearest animal, whether cow or not, as the largest bull that ever was seen, and he gets nervous at close quarters. Never circle round bison when in sight of them, but go straight in. If there is a better approach from another quarter retreat till you are out of sight and then go round. If you are a moderately good stalker you can easily get within 100 yards, but the surest shots are made by getting as close as you can, and you should therefore go on without firing as long as the bull remains unsuspicious. I have more than once got within ten yards of bulls lying down, and generally get within 50 yards of a solitary bull. Herds are not so easily approached within 50 yards, but you can almost always get within 100 yards. Bison are easily killed with a single ball if hit in the right place; for a broadside shot fire low down behind the elbow, or high up just below the backbone, where the dorsal ridge terminates, or through the centre of the neck. One shot from an Express rifle in any of these spots is enough. Opinions differ as to the best rifle. I began with a 12-

bore rifle, firing 4½ drams of powder, and found it did its work well. I then tried an 8-bore gun with 9 drams, which was good too, and of late years I have shot with a 500 Express with a solid steel plug in a leaden bullet in place of the ordinary copper tube in a hardened bullet. The steel plug bullet expands as well as the usual bullet, but has greater penetration. I prefer the Express for the first shot at a bison; if properly placed it kills at once. To follow a wounded bull into long grass or thick jungle I prefer the 8-bore. The ordinary Express bullet, as also the steel plug one, penetrates the skull easily. The Express is no use in my opinion for the chest shot, or for firing at the stern. The 8-bore will drive the ball through the chest into the lungs. I also with this weapon twice killed bison at close quarters with a raking shot through the stern into the body. This shot should not be taken with a less powerful gun. Neither the 8-bore nor 12-bore will drive the ball right through a large bull broadside, as the ball is stopped by the skin on the opposite side. The ball should be spherical and hardened, twelve parts of lead to one of tin. The head should not be high, on a line with the root of the horn; between the eyes is too low for the brains if the forehead is at right angles with the gun. Head No. 3 has the bullet hole in the right spot. Owing to their habit of poking their noses high into the air when they see you, it is not easy to get the right angle into the brain, and it is not a shot to take except as the *coup de grace* to a wounded animal. Every sportsman should make a point of studying the interior economy of the animal he shoots. This can best be done by ocular inspection. Cut the animal open and examine the cavity of the chest and the cavity of the stomach. You will be surprised to find what a lot of space there is where a bullet would do little immediate damage. The bisons' stomachs have each a moderate sized haystack in them, which it is worse than useless to perforate with a bullet. The lungs in my opinion afford the best mark, and a shot there is certain death in a few seconds. If a bison is standing when fired at, he seldom drops to the shot behind the shoulder, but gallops from 50 to 200 yards before dropping dead. If he is galloping the same shot drops him dead on the spot. Why this should be I do not know, but so it is. When you have killed him you will find the old bulls almost hairless; their skin exudes a thick oily substance which you can scrape off with a knife. It looks like dirty oil. Mr. Sanderson says that the hide of an old bull after a sharp hunt gives out an oily sweat. He adds: "In this peculiarity the bison differs from domestic cattle which never sweat under any exertion." In this I think he is mistaken. This oily sweat is natural and not the result of exertion. I remember shooting an old bull at 8 a.m. that jumped up close to my horse; it did not go 100 yards, its skin glistened with this oily exudation; and I have killed others though after the day had got hot, that had undergone no exertion, in a similar state. If you pass your hand along the hide of a younger brown bull it will become quite greasy, though you cannot see the moisture as you can on an old hairless bull. Shortly after death if the bison has been drinking recently the water runs out of his mouth and forms a nasty puddle. He is generally infested with large ticks on the inside of the thighs, so it is as well not to sit triumphant on his carcase. His tail makes excellent soup; the tongue is very good flesh, and would probably be better salted. The flesh of an old bull is to my mind tough and tasteless; the marrow is too large and rich. The gall bladder will sometimes be taken by your men. On my asking what the use of it was, they informed me that the contents rubbed on the noses of young dogs made the dogs very keen of scent in hunting deer and pig. In most places your men will not eat the flesh of the bison. Where they do they cut the meat into long strips and dry the flesh in the sun; the hides are sometimes taken by them and utilized as a covering to the roof of their huts. The bison in uttering its snort of alarm expells the air with great force from his nostrils, and according to Dr. Francis Day, in his account of Cochin, the natives there assert that it will root up a stone from the ground and discharge it with a snort with fatal effect at his adversary—an idea which, though of course fanciful, might readily occur to one. Bison are often blundered on as one stalks through the jungle, and a head procured with little or no trouble. You do not look with so much satisfaction on such a head as you do on one that you have tracked for many miles. Bison will on such occasions stand and stare at your horse, regardless of the men accompanying you, giving you time to dismount and shoot them. On two occasions I rode almost on to bulls before they rose from their lair in the grass. They stood staring at the horse only a few yards off, and made threatening demonstrations with their horns, but did not charge. Some of the solitary bulls have no doubt been expelled from the herds after a tough fight: one I killed was covered with a number of wounds quite fresh, inflicted by the horns of a rival, but I think most of them lead solitary lives from choice. They appear to be too big and powerful to have been licked by the smaller herd bull, unless it be that their horns being blunt and broken are not a match for the sharp points of the horn of the younger and lighter bull, or it may be that they find in solitude a calm unattainable in the bosom of their families. I have never found a solitary bull bison join a herd when tracking him, though aged buffalo bulls often do. The bison is known among natives throughout the Central Provinces as the Gour. Capt. Forsyth says that the name "Gour" is unknown in Central India, and that he is call Bhinsa or Bun Bhinsa. This is certainly contrary to my experience, and I have shot in the same jungles as Forsyth did. I have heard him sometimes called Bun Bhins, but not often. The latter term is used by the natives for buffalo. It is pronounced through the nose, Bun Bise. The bison, like all the true ruminants, chews the cud by a circular motion of the jaws from right to left or from left to right, and not alternately from left to right and then right to left. If you get close enough you can see the cud passing up his throat into his mouth to be chewed in the shape of a ball just as you can in a common cow. The camel chews the cud with alternate bites from left to right and then right to left. I believe the rest of the camel tribe do the same. I intended to have looked at the llama the last time I was in the London Zoological Gardens to see, but my companion, no less a personage than our Chief Magistrate, Mr. C. P. Cooper, displayed no interest in such details, and insisted on going off to lunch and chewing the cud on his own account. Bison have never been reared in captivity. If caught as calves they soon die. There is an animal called the Gayal or Mithun (*Gavæus frontalis*) found to the east of the Brahmapootra, that is stated by Jerdon and other authorities to be easily domesticated. There is a large bull in the London Zoological Gardens, the only one I have seen; it is very like the bison and might be easily mistaken for one. The only difference I could see was that the horns grew out almost straight with little curve, and were rather flatter in shape. The one in London is an old bull, quite black. The colour, white stockings, dorsal ridge, head, &c., are exactly like the bison. His hoofs, owing to not getting sufficient exercise to wear down the new growth, are much mis-shapen. I do not think there is any fear of bison being exterminated. Shooting the old bulls does no harm. The young bulls should be spared, as it takes time to grow a good head. When you first begin shooting them, you will probably shoot a cow or two, as it is difficult for an inexperienced eye to distinguish them from the bulls, and you will mistake a cow for a bull, but one or two misadventures of this kind will disgust you, and you will be more careful and learn what a really good bull is. The natives occasionally kill them with a poisoned arrow, but they seldom shikar them. Tigers seldom kill them. I only know of one instance. Foot and mouth disease and other epidemics destroy large numbers. Within the last ten years there were bison in Salsette within 30 miles of Bombay. I believe there are none there now. I was told the last herd had died of cattle disease. They were formerly plentiful in the ghats near Khandalla. I have in my possession at home the head of a very fine bull (the measurements I have not got by me), the last one killed some 38 years ago at the foot of the ghats below Khandalla. As long as the highlands of Central India and the enormous tracts of hill and jungle in Southern India exist, I have no doubt that bison will give sport to our successors long after we have gone to the happy hunting grounds. When you have secured your trophy, if you do not take care, the horns will be spoilt by a small kind of caterpillar or grub. It is white in colour and has a large head. It bores a cylindrical hole from the inside of the horn to the surface, and in the hole thus made spins a cocoon, emerging ultimately in what looks like a beetle. It spins very rapidly. I have watched them at work. They begin to spin at the surface of the horn; if you destroy their work, the top of the hole will be covered again in half a minute. The best preventive is to remove the horn from the bony core, but you cannot always get an old bull's horns off. In that case pour boiling water or kerosine oil down between the horn and core. I have never tried beating for bison, and should think it was poor sport. Find the tracks yourself, track him yourself for miles, and kill him with a single bullet in a fair stalk, and the incidents of the day will never fade from your memory.

MISCELLANEOUS NOTES.

1.—BELIEF IN THE BIS-COBRA.

My servant came running this morning to say that there was a large bis-cobra in a shesum tree just outside the house. All hands assembled at a respectful distance from the tree and evidently were very jumpy. Going close, I found a largish Monitor on one of the boughs trying to get away from a squirrel. When the squirrel came to close quarters the lizard snapped at him, but the little fellow was much too quick for him, jumping back or round the bough, and then tackling the Monitor from another quarter. At last the latter gave in and came down the tree pursued by the squirrel with tail erect and hair frilled out in great triumph. The Monitor ran into the grass, where my terrier settled accounts with him forthwith, greatly to the sweeper's horror, who thought it was all up with "Tim, Tim." It is curious that here in the North-West Provinces the appearance of one of these monitors causes more dismay among the natives than any Krait or Cobra.* One of my men assured me he had known a woman who died from the bite of a bis-cobra.

G. J. RAYMENT.

Babugarh, September, 1889.

2.—THE WATER RAIL (*RALLUS AQUATICUS*).

I WRITE to inform you that I killed a specimen of the Water Rail (*Rallus aquaticus*) in the Bohri Taluka of Shikarpur, Collectorate of Sind, on 5th November. Hume and Marshall describe it as extremely rare, and only known to them as having been seen in the Dun, with the exception of two specimens, one of which was killed near Sialkote and the other near Abbotabad. I have carefully examined the bird, and it is undoubtedly *Rallus aquaticus* and not *Rallus indicus* the distinctive points being unmistakable.

D. GEORGE.

Sukkur, 6th November 1889.

3.—HOW A SNAKE CLIMBS.

A SPECIMEN of *Lycondon aulicus* was killed yesterday in my house while climbing up a bamboo blind (chick) stretched vertically and lashed in position. I saw the operation myself. The snake evidently climbed by hitching the edges of the ventral shields on to those of the bamboo lattice of the blind, and not by winding his body, which was entirely on the side of the blind next to me, round the bamboos. He moved slowly and not painfully or awkardly. This species of snake is notoriously apt at escalade, but this is the best thing in that way I have seen of it.

W. F. SINCLAIR.

Alibag, September 1889.

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* It is exceedingly difficult to account for the widespread belief, amongst the natives of India, in the so-called "Bis-Cobra." The young of the Common Indian Monitor (*Varanus dracæna*) is greatly dreaded in most parts of the Bombay Presidency, although curiously enough, when the lizard becomes full grown, it is called the "Ghorpad," and is recognized by the country people as being perfectly harmless. The young differ considerably from the adult, in having a mottled appearance. Many other equally harmless lizards are thought to be exceedingly poisonous by the natives in other parts of the county, where the term Bis-Cobra is applied to them—*Vide* Mr. Vidal's interesting paper on the subject on page 71 in Vol. 3 of the Society's Journal.—ED.

4.—BATTLE BETWEEN BEES AND WASPS.

I SAW in the *Pioneer* a few days ago an account of a battle of butterflies, which occurred in Japan, and as I the other day witnessed a battle between some large wasps and the large jungle bees, I thought it might interest you to hear about it. Close to my bungalow there is a ravine, in which there is a small forest of hill oaks. On these a swarm of large bees evidently intended to settle, and they were buzzing around, when first one, and then a few more, and at last a large number of these wasps (a specimen of which I send you*) appeared on the scene, and then commenced the battle. The noise of the combatants was very loud, and the bees were desperately angry, and although I was but a silent spectator, attacked me, causing me to retire. I crawled up, however, after a while and watched proceedings. A wasp would suddenly come across a bee, or *vice versâ*, and after gyrating round one another for a second or two, they closed and came tumbling down to the ground: then, as it evidently happened as far as I personally saw, the wasp was the victor, and clutching his victim in his arms, he flew away with him, and on my telling the story to some of the hillmen, they said that the wasps ate the bees. The battle started about 9 A.M. and lasted till sunset. Next morning both wasps and bees had disappeared. Perhaps there are members of your Society who may have witnessed similar occurrences, and it would be very interesting to hear about them.

H. W. HEWETT.

Almorah, Kumaon, 13*th October* 1889.

5.—MAN-EATING TIGERS.

ADVERTING to Mr. Gilbert's interesting notes on Man-eating Tigers read before the Society in September last, I should like to point out that I do not think it is the general belief at all that all man-eaters are old and mangy animals. But the converse appears to be the rule, that when a tiger does get old and mangy, or is suffering from a broken limb, so that it is not quick enough to catch t usual prey, it then takes to feeding on the easiest of all prey to secure, *viz.*, on man, and this view is borne out by Jerdon. One point, which I do not think Mr. Gilbert mentioned, was the curious fact that there are more man-eating tigresses than tigers. As a reason for this I would suggest that it may be that the tigress, with two or perhaps three cubs, finds considerable difficulty in keeping her larder well stocked. Game in some parts being scarce and exceedingly wide-awake, she therefore kills the first thing she comes across; and having once begun man-eating, all authorities agree that they never reform. In the last part of Mr. Gilbert's narrative of the Bansda man-eater, he says that as there were no more deaths in that part of the country, there was little doubt that he had killed the man-eater. But how about Mr. Crawley-Boevey's tigress? This, they say, also died, and there are, I think, more man-eating females than males; the Dewan of Bansda seems, however, to have been satisfied that Mr. Gilbert's was the right one. Mr. Gilbert also mentions that tigers do not kill goats. Whether they do or not I am not able to say, but his Bansda man-eater is credited with seventeen, according to the statement of the Dewan.

W. ST. JOHN RICHARDSON,
Capt., B. S. C.

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* *Vespa magnifica.*—ED.

6.—A WHISTLING BULBUL.

In my last communication I introduced the Madras Bulbul (*Pycnonotus hæmorrhous*) as a talking bird, and have now to record him as a whistler, for he seems to be as apt at whistling as at talking. A lady who in her quiet way takes notice of everything around her, tells me that she had one of these birds that could whistle the "Quaker's Wife" to perfection, and often from the rails in her garden it would pour forth its strains so perfectly distinct and natural that she frequently believed that it was some one outside "whistling for want of thought," and not till she actually saw the bird so engaged was she convinced that it was capable of the feat. After exhibition of such capacity, the bird should be welcome wherever pet and pupil are appreciated.

A. W. MORRIS.

Yercaud, *November* 1889.

7.—THE DAYAL BIRD AS IMITATOR.

Copsychus saularis is another bird that is as pugnacious as a gamecock, and I remember having read somewhere that it is trained for fighting purposes by some of the native of this country, but it has a sweet voice into the bargain, and is held in some esteem as a cage bird in this land, where songsters are so few. I was not aware, however, that it had an imitative faculty, and am indebted to the same lady who informed me about the Whistling Bulbul for the knowledge. One of these birds that seemed to have taken more than a passing notice of a canary's song learned to imitate it so perfectly that the lady in question was often puzzled to know whose canary it was singing outside, till one day she found out that it was a Dayal Bird that had taken the notes of her pet unto himself. Perched on a tree outside it would imitate a canary so perfectly that it was hard to tell it was not this bird singing.

A. W. MORRIS.

8.—A PET DRONGO.

I have reared many a feathered pet, but in no instance did the loss of any of them occasion me such keen regret as the death of a pet Drongo (*Buchanga cœrulescens*), which fell a victim to its overtrust and confidence in its human master. I had reared it from a little thing, and when fully fledged and able to take care of itself, often, at my call—a whistle imitating its note—it would come and perch on my hand or shoulder though it would not allow itself to be caressed, a proceeding which all birds seem to object to. That the bird somehow knew me and the members of my family was apparent, for often when out either riding or walking, I would suddenly find it alighting on me, no matter how far from home, a thing it would never do to an outsider. Did any stranger come in the bird was immediately on the defensive and permitted no familiarity. A curious instance of its antipathy to strangers and its loyal attachment to its protector was exhibited one day. A member of the family going into Capt. P.———'s found the bird alighting on him just as he entered the bungalow, and was deliberating whether he should put the intruder outside, when he heard the Captain's voice calling to him to come in. At the same time he advanced with hand outstretched to greet his visitor, when the bird, evidently thinking that an assault was meant, flew full in his face and beat off the astonished soldier. It used to be my great amusement, on going through the grounds, to whistle for the bird, at the same time extending my hand for it to perch on, and having "fixed" a gamy grasshopper to walk towards it, when away it would go and the bird would have it in the twinkling of an eye, a species of hawking I much enjoyed.

And now for the sad part of the story. When out shooting miles from home mypoor bird, as I subsequently found out (though at the time I had my doubts about its being a wild bird), in an evil moment perched in a tree overhead, and being mischievously inclined at the moment, I fired and brought down my pet Drongo, a circumstance I cannot cease regretting even to this day as an ending to so much attachment.

A. W. MORRIS.

9.—MIMICRY FOR PROTECTION AND FROM EXAMPLE.

It has lately struck me that though generally speaking the term *mimic* is applied to birds and insects that resemble or imitate other animals, either in voice, colour or style of marking, zoologically regarded it needs restrictions. To use one term to denote a multiplicity of manners and ways is to use it laxly, and Professor Meldola, after whom zoologists are inclined to follow, aware that the word *mimic* has been rather loosely applied, suggested that "the term *protective resemblance* should be applied to the appearances which tend to deceive enemies by their resemblance to motionless (vegetable or mineral) surroundings, the term "mimicry" denoting the resemblance to other animals." I would therefore suggest that while *mimic* be employed for butterflies, beetles and other insects that either for protection or some other cause take on the appearance of well protected forms, *imitation* be applied to such animals as *copy or voluntarily assume* the peculiarities of other creatures. Superficially regarded there is hardly any difference between the words suggested, and yet these hardly perceptible shades of difference add greatly to the perspicuity of meaning. If these be accepted, their *mimicry* would be the result of an involuntary assumption, while *imitation* would be a voluntary production, or, in other words, that it would arise from protective causes, this for example. Thus we should say the female of *H. missippus* "mimics" *L. chrysippus*; the above case of *C. saularis* would be one of "imitation," and such insects as *Phasma, Mantis* and the larvæ of many Lepidoptera would assume what Professor Meldola calls *protective resemblance*, *i.e.*, resembling the leaves and twigs of trees, stones, earth, seeds, &c.

A. W. MORRIS.

10.—USES OF THE SCREW PALM (*PANDANUS ODORATISSIMUS*), KEVADA, केवडा.

In Part 2 of Vol. I. of our Society's Journal there is a paper on the uses of the Screw Palm taken from the journals of the late Mr. Handley Sterndale and read by Mr. R. A. Sterndale on the 7th December 1885, and also a note on the same paper by Dr. Kirtikar. In either of these is there any mention made of a use to which the dried leaf of the *Pandanus* is put, which is to spread and polish the lac on children's toys, those bright and pretty lotas, humming tops, and so on, made of wood and covered with brightly coloured lac, with which most of us are familiar. The lac is put on by closely pressing a stick of it, of the required colour, to the wood as it revolves in the lathe. When a sufficient quantity is taken on to the wood the *Pandanus* leaf, folded into a small cushion, is applied with some pressure, when the lac is spread and most beautifully polished.

J. A. BETHAM.

11.—MIMICRY IN BIRDS.

Referring to Mr. W. E. Hart's paper on two instances of Mimicry, it may perhaps be interesting to record in our Journal that there are quite a number of birds in this country in which the power of mimicing sounds has been curiously developed. Most of us know that the two Common Shrikes of Butcher Birds *Lanius lahtora* and *L. erythronotus*, as well as the Indian Skylark or *Chandul* (*Alauda gulgula*) are capital mimics. The Racket-tailed Drongo, *Bhimráj*, is also a splendid mimic, but it is a difficult bird to keep in captivity. I was once in the forest below Pachmarhi, and seeing some pea-fowl I tried to get near enough to get a shot at a fine male in full plumage. I had a Gond with me, so told him to wait below a rock while I went on, and that if I wanted him I would whistle for him. My stalk having failed, I whistled to my attendant and was immediately answered. I waited some time, but as my friend the Gond did not turn up, I whistled again and was again answered in exactly the same note. I waited a little longer and then went through the same performance with the same result, and as it appeared the Gond had either gone back or fallen asleep, I walked back to where I had left him and found him contentedly smoking. "Why did you not come when I whistled?" said I. "Oh," he replied, "was it you that whistled? I thought it was that bird up there," and he pointed upwards at a racket-tailed Drongo high in the tree overhead. I tried the bird again, several times with notes whistled in several different tones, and was exactly answered by the bird. The imitation was exact and given back as any human being could have done it. At first when I found out the deception I felt as if I could have made a specimen of Mr. Drongo, but kinder feelings prevailed and I let him go. On mentioning this to some friends a few days afterwards a lady told me that she had possessed more than one *Bhimràj*, and that they were extremely clever at imitating sounds, straight off, as do Parrots or the Black Hill Mynas. She told me they were difficult birds to keep in captivity, but that they became very tame and interesting pets.

J. A. BETHAM.

12.—*PAPILIO POLYMNESTOR*, *P. DISSIMILIS* AND *P. PANOPE*.

I. Referring to the note by Mr. W. F. Melvin regarding Mr. Aitken's statement the *P. Polymnestor* is unknown in Bombay, and possibly throughout the Konkan, I looked back at the passage and find that I have noted that it was frequently seen at Dapoli. I remember in my early days in India how the appearance of this butterfly in our garden used to cause a display of the liveliest interest, the younger members of the family rushing out to get a nearer view and possibly secure a good specimen. It was fond of hovering over the flowers of the *Lantana*, that bush with leaves that give out an odour of black-currants when bruised. Camp Dapoli is situated in the S. Konkan some 70 miles below Bombay.

II. The flight of *Papilio dissimilis*, is remarkably strong when disturbed, and once it is frightened it goes away at a pace which defies pursuit; usually, however, it flaps along in a lazy sort of way, exactly resembling the butterflies it mimics, *D. limniace*. The flight of *P. ponope* is the same, but it resembles *E. core* in coloration. Mr. Aitken in his interesting paper on the butterflies of Bombay *vide* Vols. I. and II. of our Journal, says he has not seen the power of flight as mentioned by Distant. Both these butterflies (I think they are one and the same species) have a similar habit as those they mimic, they rest hanging at the extreme point of a naked twig and would like to be passed over by the collector as ordinary *Danainæ.*

J. A. BETHAM.

13.—BEARS BEING EATEN BY TIGERS.

I GAVE a note on this subject in a recent number of the Journal.* Now I find in Captain Baldwin's "Large and Small Game of Bengal," 2nd edition, page 21, the following:—

"An extraordinary event happened while I was stationed at Jhansi. Our Brigadier, Col. B——n (since dead, I regret to say), and one of his subalterns, C——é, were out together in Seepree district tiger shooting. One morning they put up a large tiger and shot him. The beaters reported to them that they had come across the carcase of a bear, recently killed and half eaten, near the spot where they had put up the tiger just accounted for. The sportsman examined the remains of the bear, and became convinced that the tiger had not only killed, but devoured the missing portion of poor "Bhaloo." To clear up all doubt they had the tiger opened, and portions of the bear's flesh were found in his stomach. This is the only instance of the kind that I have ever heard of."

H. LITTLEDALE.

Baroda, September 1889.

14.—MEASUREMENT OF INDIAN ELEPHANTS.

THE following measurement of two Elephants shot near here last year may be of interest, as they have not yet been published; and I am inclined to think that the tusks of the second animal have not been exceeded except by the 8 feet enormity from Assam :—

No. 1. Height, measured on ground, immediately after death, 9′ 8″.

Unbroken Tusk—Length, 5 feet; weight 56 lbs.

Broken Tusks, " 4 " " 46 "

(Both tusks were cut out of the head at the junction with the skull.)

No. 2. Height, measured on ground between two upright bamboos placed at top of shoulder and sole of foot, slightly over 10 feet. (The forelegs were slightly drawn up and could not be pulled out straight.)

Circumference of forefoot	5′
Unbroken Tusks—	
Length	6′ 7″
Circumference at gum	1′ 4¾″
Circumference inside the gum	1′ 5″
Weight 3 days after death	65 lbs.

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* *Vide* page 153, Vol. IV.

Broken Tusks—

Length	5′ 6″
Circumference at gum	1′ 4½″
Circumference inside the gum ...	1′ 4¾″
Weight, 3 days after death. ...	56 lbs.

CHARLES DALEY,
Asst. Engr., Bengal-Nagpur Railway.

Telanpali, Sambulpur viâ Raigarh,
September 1889.

15.—A BRANCHING ARECA-NUT PALM.

I HAVE to add to the accounts of branching Palms, formerly recorded in our Journal, the following note of a branching Areca-Nut Palm (*Areca catecour*) now standing in a garden at this place. It is said to be 10 years old, and is about 20 feet high. About 3 years ago it was attacked by a disease called "Band," which has killed many trees here, when the top almost died away, and has now been replaced by 15 to 18 distinct tops, growing in a flat close bundle in such a manner that one cannot count them accurately without climbing the tree. The whole tree has now the appearance of a gigantic housemaid's-broom, except that the "business end" is green and not yellow.

This case supports the theory put forward in this Journal that these abnormal branching palms are the result of injury to the trees.

It will be worth while to watch whether the branches mature. At present they are only in the green state, and it is likely that they will die off before they set into hard wood, but I have requested that the tree may be carefully preserved.

W. F. SINCLAIR,
Bo. C. S.

Camp Shriwardhan, Janjira State,
7th December 1889.

17.—MIMICRY IN CATERPILLARS.

I HAVE just read Mr. Hart's note, published in the last number of the Journal, on the Caterpillars which, as long as it is small, mimics the excrement of birds. I have frequently kept that species from egg to imago ; all the butterflies I got were superficially alike, and I did not think of distinguishing males and females. But with reference to Mr. Hart's idea that the mimicry is to deceive birds, I have found that several birds will not eat that particular species of caterpillar, because of its evil smell, and, I presume, equally evil taste. The caterpillars are common during the rains on orange and pumelo trees, so now that Mr. Hart has raised questions many observations will probably be made.

BENJAMIN AITKEN.

Lucknow, September 1889.

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PROCEEDINGS.

Proceedings of the September Meeting.

The usual monthly meeting of this Society took place on Wednesday, the 1st September 1889. Mr. J. D. Inverarity presided, a large number of members being present.

Mr. H. M. Phipson, the Honorary Secretary, acknowledged the following contributions to the Society's Museum :—

Contributions during August.

Contribution.	Description.	Contributor.
1 Crow's nest	Made of telegraph wire	Mr. S. Brooks.
1 Florican (alive)............	Sypheolides aurita	Dr. D. MacDonald.
Fossils of Leaves	From the Nerbudda, near Jubbulpore.	Mr. R. P. W. Strong.
1 Chameleon	Chameleo vulgaris	Mr. W. S. Threlfall.
1 Lizard	Lygosoma punctatum	Dr. Brown.
A quantity of Sea Snakes, Fish, and Shells.	From Alibag	Mr. W. F. Sinclair, C.S.
A quantity of Turtle Eggs.	Chelonia viridis	Do.
3 Cobras (alive)	Naga tripudians, from Deoli	Mr. Sutton Jones.
1 Dugong	Halicore dugong, from Aden	Dr. Monks.
1 Manura	Paradoxurus musanga	Mr. H. R. Cooke, C.S.
Several Guinea-Worms..	From Hingoli	Dr. Mallins.
1 Tailor Bird's nest.........	....	Mr. J. O'Connell.
1 Chameleon (alive).........	Chameleo vulgaris	Mr. M. B. Kolah.

Contributions to the Library.

Journal of Comparative Medicine and Surgery, Vol. X., No. L. 3, in exchange.

Fauna of British India—Fishes, Vol. I. (Day), presented by the author.

Notes on the Indian Chiroptera (Blandford), presented by the author.

Transactions of the Royal Dublin Society, Vol. IV., Parts 2 to 5, in exchange.

Proceedings of the Royal Dublin Society, Vol. III., Parts 3 to 6, in exchange.

Exhibits.

Captain Herbert, A. D. C., exhibited a curiously deformed tooth of a wild boar.

The following papers were then read :—

Notes on Man-Eating Tigers, by Mr. Reg. Gilbert.

Two curious instances of mimicry, by Mr. W. E. Hart. Both papers appeared in Part 3, Vol. IV., of the Society's Journal.

Proceedings of the October Meeting.

The usual monthly meeting of the members of this Society took place on Tuesday, the 1st October, and was largely attended. The Hon. Mr. Justice Hart presided.

The following new members were elected :—Mr. G. F. Horbury, Colonel F. H. Jackson, Mr. D. Gostling, Mr. W. H. Wolff, C.E., Mr. T. F. W. Wood, Dr. C. Mallins, Mrs. Blathwayt, Mr. T. A. Bland, Mr. J. F. Duthie, Mr. W. C. Hughes, Mr. W. Harvey, C.S., Mr. A. M. Gubbay, Mr. J. R. Chico, Captain F. G. Alexander, and Mr. C. J. Dalby.

Mr. E. M. Slater, the Honorary Treasurer, then acknowledged the following contributions to the Society's Museum:—

CONTRIBUTIONS DURING SEPTEMBER.

Contributions.	Description.	Contributor.
1 Snake	Trimeresurus trigonocephalus.	Mr. E. H. Aitken.
1 Bear (alive)	Ursus labiatus	Dr. Herbert.
A quantity of Snakes and Insects.	From Travancore	Mr. W. Mahon Daly.
1 Tree-shrew	Tupaia elliotti	Do.
1 Butterfly	Hestia haydeni (from Upper Burmah).	Mr. C. F. Gilbert.
1 Snake (alive)	Lycodon aulicus (from Dhond).	Anonymous.
A quantity of Locusts	From Ahmedabad District	Mr. H. E. M. James, C.S.
1 Panther's Skull	Felis pardus	Capt. F. J. Winter.
1 Oyster Catcher	Hœmatopus ostralegus	Mr. W. F. Sinclair, C.S.
2 Snakes	Daboia elegans and Ptyas mucosus.	Mr. C. E. Kane.
1 Krait (Albino)	Bungarus arctuatus	Mr. L. H. Butcher.
2 Snakes	Silybura macrolepis	Do.
1 Chameleon (alive)	Chameleo vulgaris	Do.
1 Trap-door Spiders' Nest.	From Igatpuri	Do.
Several Guinea Worms (alive).	Draculculas sp.	Dr. C. Mallins.
1 Golden Plover	Charadries fulvus	Mr. W. W. Squire.
1 Little Stint	Tringa minuta	Do.
2 Small Terns	From Kennery Lighthouse	Do.
Several large Moths	From Almora, N.-W.P.	Miss Brooke.
1 Nest of Common Honeysucker.	Do.	Do.
1 Snake	Gongylophis conicus	Mr. R. A. Willis.
1 Large Krait	Bungarus arctuatus	Mr. P. Morris.
2 Snakes	Zamenis diadema and Dipsas gokool.	Colonel Hore.
A quantity of Marine Shells, Fishes, &c.	From Alibag	Mr. W. F. Sinclair, C.S.
2 Bar-tailed Godwits	Limosa laponioa (from Alibag).	Mr. W. F. Sinclair, C.S.
1 Blackbird, alive (Albino)	From Japan	Capt. Nantes.
1 Octopus	Do.	Do.

MINOR CONTRIBUTIONS.

From Mr. W. F. Hamilton; Mr. Kaikobad C. D. Adenwalla; Mr. E. H. Elsworthy; Mr. W. F. Sinclair, C.S.; and Mr. J. R. Chico.

CONTRIBUTIONS TO THE LIBRARY,

	Presented by.
Bulletin de la Société Zoologique de France, 1889	In exchange.
List of the Lepidopterous Insects collected in Cachar by Mr. Wood-Mason, Part II. "Rhopalocera," by J. Wood-Mason and L. De Nicéville.	The Authors.
Records of the Geological Survey of India, Vol. XXII., Part 3	In exchange.
Manual of New Zealand Coleoptera	Do.
Proceedings of the Royal Society of Victoria, Vol. I.	Do.

PRESENT TO THE BRITISH MUSEUM.

The Honorary Treasurer stated that the committee had received a letter from Dr. Gunther, of the British Museum, acknowledging safe receipt of the skeleton skin, stomach, and fœtus of a *Neomeris kurrachiensis*, sent to him by the Bombay Natural History Society and adding that the specimen would be of the greatest use to Mr. Flower in his forthcoming paper on this genus of dolphins.

Mr. J. D. Inverarity then read a very interesting paper on "The Indian Bison with some Notes on Stalking him," which appears in another part of this number.

PROCEEDINGS OF THE MEETING OF 12th NOVEMBER 1889.

The usual monthly meeting of the members of this Society took place on Tuesday, the 12th November, Dr. Maconachie presiding.

The following new members were elected:—Mr. Eduljee Dinshaw, Mr. C. G. Dodgson, C.S., Mr. H. W. Keys, Surgeon-Major J. Scully, Mr. E. M. Ewart, Mr. L. G. Prickett, Mrs. C. C. James, Mr. W. S. McClelland, Colonel W. S. Hore, Mr. A. P. Young, Surgeon L. F. Childe, Mr. J. C. Jones, Captain the Hon. R. T. Lawley, Mr. Aga Shaikh Mahomed, Mr. E. G. Williams, Mr. H. C. V. Hunter, Mr. C. A. V. Davies, Mr. P. Thompson, H. H. Prince Baldevjee of Dharampore, Mr. A. F. Cox, M.C.S., Mr. G. H. R. Hart, Mr. A. R. Bonus, C.S., and Mr. Isaac Benjamin.

Mr. H. M. Phipson, the Honorary Secretary, then acknowledged the following contributions to the Society's collections, *viz*:—

CONTRIBUTIONS DURING OCTOBER.

Contribution.	Description.	Contributor.
A quantity of Fishes, Crabs, &c.	From Aden	Capt. Shopland.
1 Snake	Tropidonotus quincuntiatus.	Mr. C. E. Kane.
1 Snake	Trimeresurus sp.	Mr. E. H. Aitken.
1 Oryx (alive)	From Berbera	Mrs. Ashby.
1 Loris (alive)	Loris gracilis	Mr. C. R. Hawkins.
2 Cobras (alive)	Naga tripudians	Mr. G. Sutton Jones.
1 Monkey Skin	Colobos guereza.................	Rev. G. C. Gilder.
1 Snake (alive)	Dipsas gokool	Mr. R. Maclean.
1 Snake	Callophis nigrescens	Anonymous.
A number of Botanical Specimens, mounted and classified.	From England	Mr. A. G. Pell.
1 Piece of Coral	From the Laccadive Island.	Commdr. Carpenter, R.N.
1 Large Kangaroo	From Melbourne...............	Mr. A. Gilmour.
1 Emu	From Melbourne...............	Mr. Frank Bailey.
2 Wallabys	From Melbourne...............	Mr. Frank Bailey.
A quantity of Giant Oysters.	From Bombay Harbour......	Capt. Thorburn.
1 Chameleon (alive)	From Zanzibar	Miss Skinner.
Several pieces of Petrified Wood.	From Upper Burmah	Comdr. Carpenter, R.N.
1 Bison's Head	From Western Ghauts	Mr. G. K. Wasey.
115 Hymenopterous Insects.	From the Himalayas.	Mr. H. M. Phipson.
21 Dipterous Insects		
268 Lepidopterous do. ...		
57 Orthopterous do. ...		
20 Coleopterous do. ...		
4 Snakes		
1 Skin of Musang...........	Paradoxurus bondar	Mr. H. M. Hewett.
2 Pair of Chital Horns (interlocked)	From Bassim, Berar	Mr. H. A. Heath.

Contribution.	Description.	Contributor.
1 Snake	Daboia elegans	Mr. H. W. Barrow.
1 Indian Rock Snake	Pythen molurus	Mr. Evezard.
48 Birds' Eggs	From Kharaghoda	Miss A. Dickinson.
2 Malabar Whistling Thrushes (alive).	Myiophonus horsfieldi.....	Mr. G. Vidal, C.S.
1 Cobra (alive)	Naga tripudians	Mr. Bulvantrao Jayaram.
1 Snake (alive)	Cynophios malabaricus ...	Mr. Bulvantrao Jayaram.
1 Snake (alive)	Tropidontus stolatur	Mr. O. Meyer.
1 Snake (alive)	Cynophis malabaricus ...	Dr. Kilkelly.
1 Cobra (alive)	Naga tripudians	Mr. P. R. Mehta.
A quantity of Butterflies...	From Karwar	Mr. T. R. Bell.
1 Manura (alive)	Paradoxurus musanga ...	Mr. Ramchundra Trimbuck.

MINOR CONTRIBUTIONS FROM

Mr. J. W. Mayer, Mr. J. A. Betham, Miss F. Bapty, Mr. E. A. Corke, Mr. H. M. Hewett, Miss Bessie Rean, Mr. Dattatraya Bhau and Mr. J. Janni.

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Fauna of British India—Fishes; by E. T. Blandford, Vol. II. (Day), presented by the author.

Report on the Kolar Goldfield; by P. Bosworth Smith, F.G.S., presented by the author.

The Indian Forester, July 1889, in exchange.

Proceedings of the Linnæan Society of New South Wales, Vol. IV., part 2, in exchange.

Memoires de la Société Zoologique de France, Vol. II., part 1, in exchange.

Bulletin and Annual Report of the American Museum of Natural History in exchange.

Annual Report of the Secretary for Mines, Victoria, in exchange.

Report of the Mining Registrars on the Gold Fields of Victoria, in exchange.

A special vote of thanks was passed to Mr. Frank Bailey of London and Mr. A. Gilmour of Melbourne for their valuable contributions to the Society's Museum.

The Honorary Secretary drew attention to the learned paper which Mr. L. de Nicéville, of Calcutta, had written for the Society's Journal, describing a number of new and rare Indian butterflies. The paper would, he said, very shortly be published in part 3 of the Journal. The coloured lithographed plates (containing illustrations of twenty-one butterflies), which had been received from West, Newman & Co., of London, for the above paper, were greatly admired.

Amongst the contributions above acknowledged was a pair of chetul's horns, received from Mr. H. A. Heath, of Bassim, Berars, which excited much interest. The stags, while fighting, had in some extraordinary manner so interlocked their antlers that they had found it impossible to separate them, and consequently must have died from starvation, or have been eaten by wild beasts.

Mr. W. F. Sinclair, C.S., then read a short paper, entitled "Down the Coast," describing, in a very clear and interesting manner, the character of the scenery on the sea coast, south of Bombay, between Alibag and Janjira. The lecturer gave a lively account of the principal objects of Natural History likely to be met with during the trip, and illustrated his remarks with various specimens of birds, fish, &c., from the Society's collections.

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